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ABSTRACT

This guide is designed to help educators sort through the vast amount of information that exists about the educational use of microcomputers. The first of five chapters takes the educational administrator through the decision process that is typically associated with choosing and adopting microcomputers for the school. For each point in this process, applicable resources are cited and reviewed. The chapter examines items such as hardware selection and purchase, software selection, computer literacy, teacher and staff inservice education, and potential applications. The second chapter contains a list of journals and periodicals dedicated to the use of the microcomputer and related technology in education. In the third chapter, a list provides organizations that have educational computing and related instructional technologies as a primary focus, while in the fourth chapter, commercial educational software vendors are listed. The final chapter contains an extensive annotated bibliography of literature related to microcomputers and vocational education. The annotated entries are grouped into seven categories and an explanation of the classifications is provided. (Especially useful to the vocational educator is a section devoted to examples of microcomputer use in vocational and technical schools.) (KC)

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Research & Development Series No. 239B

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AN ADMINISTRATOR'S GUIDE TO MICROCOMPUTER RESOURCES

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1983

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FOREWORD

In almost every direction that the educator turns today, he or she is likely to be confronted with terms like microcomputer technology, computer literacy, software selection and evaluation, and computer-based education. Although often carrying with them a certain mystery, such terms should neither confuse or threaten the educator. For the school administrator, the classroom instructor, the school media specialist, and all others in the educational sector who must both involve themselves with microcomputers and incorporate computer literacy, computer-based education, and software selection and evaluation into their instructional systems, assistance and advice are available.

This report has been designed as a resource guide that will help educators locate needed information and assistance. Within the following pages, both the potential and current computer-using educator will find helpful lists of organizations, journals and periodicals, as well as an extensive bibliography that provides a rich variety of citations for many aspects of educational computing.

This document is one of two that the National Center for Research in Vocational Education has produced especially for the computer-using educator. Although designed primarily for the vocational educator, the content of both reports is instructive for all educators. This report, used either by itself or in conjunction with Microcomputers in Voc Ed: A Decision Guide will be a valuable addition to the field of educational computing.

The National Center is indebted to Dr. James P. Long who served as project director and Gale Zahniser who served as principal author of this report. Special thanks is also extended to Dr. Leonard Nasman who provided valuable guidance and advice during the early stages of this project.

Gratitude is also due to Carolyn Goodrich and Beverly Haynes for their expert typing assistance. Additionally, special mention needs to be made of the excellent editorial help that was provided by Janet Kiplinger and Sharon Fain.

Robert E. Taylor
Executive Director
The National Center for Research
in Vocational Education

EXECUTIVE SUMMARY

Microcomputers have the potential for altering significantly the manner in which instruction is offered to students in our nation's vocational and general educational institutions. Predictions regarding such changes include the following:

- A faster rate of learning for students who use microcomputers
- Curriculum and instructional methods tailored for students' individual learning styles
- Availability of a wider variety of subject matter
- Greater geographic and scheduling flexibility for students and instructors
- Greater possibility for life-long learning for adults
- More potential for retraining and upgrade training for those making career changes

At the present time, the ability of the microcomputer to actually generate changes such as these has yet to be proven. However, the fact remains that the microcomputer is a form of technology that is increasingly being used in almost all areas of our work and living environment.

As a result, today's and tomorrow's students need to be introduced to this new technology and its many applications while they are in school.

Incorporating a microcomputer into a school's instructional and administrative process is a task that requires a significant amount of time and planning effort. Decisions need to be made regarding the type of hardware that is best suited to a school's needs, the type of instructional software that is required, the most effective methods of providing computer literacy to instructors, staff, and students, and the most appropriate manner for incorporating microcomputer applications into the instructional process.

At first glance, school admministrators and instructors may feel overwhelmed and confused by the number of decisions that must be made and the amount of information that may be needed to make accurate, informed choices. However, neither confusion nor a sense of being overwhelmed need be the plight of the administrator or instructor. This is because an incredible number of resource and guide materials have been developed and written to assist those who are responsible for decisions connected with microcomputer selection and utilization. In fact, those who are searching for resources and information may find that their problem is not one of locating appropriate information. Rather, greater difficulty may arise from trying to find the most appropriate material from that which is available.

This guide has been designed and written in order to help education sort through the vast amount of information that exists about the educational use of microcomputers. The first chapter, The Selection and Identification of Resources, takes the educational administrator

through the decision process that is typically associated with choosing and adopting microcomputers for the school. For each major point in this process, applicable resources are cited and whenever appropriate, briefly reviewed. This chapter examines items such as hardware selection and purchase, software selection and purchase, computer literacy, teacher and staff inservice education and potential applications. This chapter will not provide the administrator with definite answers to questions about microcomputer use, but will point the direction to these sources that will contain informative material and, hopefully, needed answers.

The second chapter of the guide, Periodicals and Journals: A Sample Listing, contains a rather extensive listing of journals and periodicals dedicated in whole or in part to the use of microcomputer and related technology in education. Several sources are included with the listing that routinely (e.g. monthly or quarterly) classify the material that is published in many of the publications. Journal and periodical publishings are often the best way of keeping abreast of the ever-changing microcomputer field. Often, books and major studies are somewhat outdated by the time of their publication. Thus, a listing of the major journals and services that classify writings from many publications is a valuable tool for both administrators and instructors.

In the third chapter of the guide, the reader will find a rather extensive listing of organizations that have educational computing and related instructional technologies as a primary focus. Many of the organizations listed deal with a variety of technical issues germane to a broad spectrum of educational settings. Several, however, focus on particular subject areas or types of technology. Additionally, many of the organizations have special interest groups or subgroups that deal with a specific aspect of educational computing.

The organizational listing is of value to the educational administrator or instructor in several ways. For example, many, if not most of the organizations publish journals, periodicals and information bulletins. Also, most of them have annual conferences at which discussions, presentations, and demonstrations are offered that provide updates on issues and technological developments in educational computing. And finally, many of the organizations have local chapters that can serve as both a support and a problem-solving group for the educational adiminstrator or instructor.

In the fourth chapter of this guide, a partial listing of commercial educational software vendors is found. The number and variety of companies that produce educational software are far too numerous to include in this document. However, this listing can be a good reference base for the administrator or instructor who has software needs. Those who are searching for commercial software will need to keep in mind both the applications for which material is needed and the hardware that is available. In a volume of this length, it was not possible to conduct an extensive screening of software. Rather, the reader has been given a type of road map that will give some direction to the software search. This list, along with other references to guide and sourcebooks for software selection and evaluation highlighted in other chapters of the guide will help the reader to locate software tailored to specific educational uses.

The fifth chapter of the guide contains an extensive annotated bibliography of literature related to microcomputers and vocational education. The annotated entries are grouped into seven categories for the reader's convenience. Using the classification, the reader will be able to locate easily those reports, articles, books and monographs that relate to a particular interest. Especially useful to the vocational educator is a section devoted to examples of microcomputer use in vocational and technical schools. Accompanying the bibliographic entries is a brief explanation of the classification scheme and its contents.

All in all, this guide provides the vocational education community with a good basic reference for the selection and implementation of microcomputers. The guide will not automatically provide answers to all computing questions that an educator may have. It will, however, point the way to writings and guides that can provide answers. The microcomputing field is far too diverse for any one document to be able to fulfill every need. Consequently, a document that can offer direction to the search for assistance is perhaps the most valuable kind of tool, after all.

CHAPTER I

THE SELECTION AND IDENTIFICATION OF RESOURCES

The use of microcomputers in education is growing rapidly yet unevenly. Some schools and districts have progressed significantly toward completing tasks associated with microcomputer use such as (1) choosing and purchasing microcomputer hardware; (2) establishing a process for software selection and evaluation; (3) designing and implementing computer awareness and literacy training for instructors and staff; (4) developing K-12 goals and objectives for student literacy and awareness training; and (5) integrating the microcomputer into at least selected parts of the instructional process. Other schools, however, are at the stage where educators are discussing and thinking about microcomputers but have taken no steps to plan for their purchase and use. Still other schools and districts are somewhere between these two extremes on the spectrum.

No matter where a school, school district, or postsecondary institution stands on the spectrum of microcomputer adoption and use, there are a variety of resources that can assist educators in locating and selecting needed information. As will become evident from both the following discussion and from a glance at the information found in the Annotated Bibliography, there is almost a glut of reference material and advice available to the educator. Thus, the problem is not one of locating helpful resources. Instead, the difficulty for the educator lies in locating the right information or advice from the available material.

The objective of this discussion is to provide a "road map" that an educator can use to find and select the appropriate and needed resources. Helpful articles and reports that surfaced during the literature review are highlighted in a systematic, organized manner so that the educator can quickly identify those that are most germaine to his or her particular needs or situation. Whenever possible, a brief summary of the resource is provided so that the reader can easily determine its relevance and utility. In all cases, the reader should remember the information and discussion presented here are only a starting point. The brief narrative under each topical area provides an idea of the type of literature that is available and suggests a direction the educator can pursue to find similar information that is of value. Also, the discussion as a whole presents a structure that the educator can use to organize and sort through the massive amount of information that is currently being produced about the use of microcomputers for educational administration and instruction.

A Microcomputer for the School or Classroom—Yes or No?

For schools and districts that have not yet decided that a microcomputer would be an asset, two types of information can provide useful and valuable knowledge. One type refers to books and periodicals that deal broadly with the potential role that computers and microcomputers can play in both the instructional and administrative life of a school. The other refers to books and articles that broadly review microcomputer technology.

There are also several sources that will acquaint educators with the role that computers and microcomputers can have in the educational process. Among those that may be of value are the following:

- *Computers and Education*, by James L. Poirot. Austin, TX: Sterling Swift Publishing, 1980.

- *Computers for Everybody*, by Jerry Willis and Merl Miller. Beaverton, OR: Dilithium Press, 1981. This book is not written specifically about education. However, it presents an easy-to-understand explanation of the microcomputer and the value it brings to both the business and the home.

- *The Computer in the School: Tutor, Tool, Tutee*, by Robert P. Taylor. New York, NY: Teachers College Press, 1981. Although not specifically about microcomputers, the book presents essays by five authors on the benefits that computers bring to the educational process.

- *School Administrator's Introduction to Instructional Use of Computers*, by David Moursund. Eugene, OR: International Council for Computers in Education, 1980.

- *Microcomputers in Education, by Cheryl Anderson. Dallas, TX: Texas Association of Educational Technology, 1980.*

There are also other articles that will help educators select and purchase the appropriate microcomputer. The majority of these articles focus on issues and concerns much more specific than those in the resources just described. For example, several authors suggest that software availability should be a decisive factor in the ultimate selection of a particular brand of hardware. Others focus upon elements such as a microcomputer's limitations, the most appropriate type of retail establishment from which to purchase a microcomputer, the physical location of a computer once it is purchased, and selection of the best peripherals for the computer. Examples of articles that emphasize these themes are as follows.

- "Which Micro for Me?: A Guide to the Prospective User," by Art Boterell. *Educational Computer Magazine* 2, no. 1 (January-February 1982): 30-31, 50-51.

- "Microcomputer Selection Needs Careful Evaluation," by Robert P. Behling and Lloyd D. Brooks. *Business Education Forum* 36, no. 3 (December 1981): 30-31.

Other articles are to be directed toward issues such as—

- "What Popular Computers Can': Do" by Jonathon Erikson, *Popular Computing* 1, no. 1 (November 1981): 52, 54, 56.

- "Let the Buyer Beware: Choosing the Right Computer Store" by Barbara Schwartz in *Personal Computing*, 1, no. 1 (November 1981): 82-84, 86, 88.

- "The Computer Goes to School," by Sally Banks Zakariya. *The Principal*, 61, no. 5 (May 1982): 6-19, 52-54.

- "Computer Literacy - A National Crisis and a Solution for It," by Arthur Luehrman. *BYTE* 5, no. 7 (July 1980): 98-99, 101-102.

- "Dawn of a New Age: The Microcomputer in the Schools of the 80s," by David K. Mosow and Dale R. Rice. *Educational Computer Magazine* 1, no. 4 (November-December, 1981): 44-46, 48.

- "Computers Mean New Decisions," by Leonard O. Nasman. *VocEd* 57, no. 3, (April 1982): 37-38.

- "The Silicon Age and Education," by Harold G. Shane in *Phi Delta Kappan* 63, no. 5, (January 1982): 303-308.

Many papers and articles have been written that explain microcomputer technology to those who are not yet acquainted with it or who are uncertain about the value of the microcomputer for their particular situation. Among such available papers and articles are the following:

- "Inside Microcomputers: What Is a Micro? A Bus? A Floppy Diskette?" by Franz J. Frederick. *Today's Education* (April-May 1982): pages 17-19.

- "What Is a Popular Computer," by Wendy Quinones. *Popular Computing* 1, no. 1, (November 1981): 26-28, 30.

- "Explaining Computer Related Concepts and Terminology," by Harold W. Lawson, Jr. *Creative Computing* 7, no. 10, (October 1981): pp. 92, 94, 96, 97, 98-101.

- *A General Introduction to Microcomputers*, by Viktors Muiznieks. Urbana: Department of Secondary Education, Illinois University (November 1978).

- "Microcomputers: Their Selection and Application in Education." Special Issue. Ralph Van Dusseldox and Dennis W. Spruck, eds. *Association for Educational Data Systems Journal*, 13, no. 1, (Fall 1979).

- "How to Make the Right Decisions about Microcomputers," by Stuart Milner. *Instructional Innovator* 25, no. 6, (September 1980): 12-19.

Several of these materials may appear dated. However, for the educator just beginning to investigate microcomputers, these sources offer an overview of the microcomputer itself, issues and questions that need to be considered before a decision is made to purchase one, and potential benefits and costs to the educational institution that utilizes a microcomputer.

Resources for Determining the Merits of a Microcomputer

There are several informational sources to help educators determine the merits and benefits that microcomputers can bring to their schools. One of the best ways to obtain information of this type is for the educator to spend time reading and browsing through recent periodicals and journals related to microcomputers. Several of the materials already cited contain appendices that list such publications. Additionally, a guide to helpful periodicals and journals related to microcomputing can be found in the following:

- *A Survey of Computer-Related Periodicals*, compiled and edited by Jim Michelson. Lansing, MI: Michigan State Department of Education, 1981. The survey lists over sixty computer-related periodicals. A brief annotation is provided for each entry. All

periodicals are published in the United States, and are of general use to the users of computers or microcomputers.

- *Micro . . . Publications in Review*, edited by Robert B. Vogeler. Arlington Heights, IL: Vogeler Publishers, Inc., 1982. This publication is an index designed for those interested in micro-and minicomputers. Published monthly, the index contains the table of contents pages of major publications related to the micro- and minicomputer marketplace. An easy-to-use subject index of articles is also included.

- "Special-Interest Microcomputing Publications," by William L. Colsher. *On Computing*, 2, no. 2, (Fall 1980): 60-66.

Many specialized associations and professional groups publish newsletters and informational journals that can acquaint educators with the merits of microcomputing and explain a variety of potential applications. Although a fairly comprehensive listing of these groups is included in Appendix C, the following organizations are offered as illustrations.

- **Association for Educational Data Systems**, 1201 16th Street, N.W., Washington, D.C., 20036

- **Computer-Using Educators** (CUE), Box 18547, San Jose, California, 95133

- **Northwest Regional Education Laboratory**, 300 S.W. Sixth Avenue, Portland, Oregon, 97204

- **Society for Applied Learning Technology**, 50 Culpepper Street, Warrenton, Virginia 22186

- **National Audio-Visual Association** (NAVA), 3150 Spring Street, Fairfax, Virginia, 22030

- **American Society for Information Sciences** (ASIS), 1115 6th Street, N.W., Suite 215, Washington, D.C., 20036

- **ERIC Clearinghouse on Information Resources**, Syracuse University School of Education, Syracuse, New York 13210

- **Education and Information Exchange** (EPIE) Institute, P. O. Box 620, Stony Brook, New York, 11790

- **Center for Learning and Telecommunications** (a program of the American Association for Higher Education), One Dupont Circle, Suite 600, Washington, D. C., 20036

Resources for Selecting and Purchasing a Microcomputer

For the educator or administrator who has actually decided to purchase one or more microcomputers for a school, informational needs are somewhat more specific and detailed. For such persons, there are a variety of sources to assist with the planning and selection process that should proceed the actual purchase of a microcomputer.

A somewhat dated (but nevertheless comprehensive) book that will assist the educator who is planning to purchase a microcomputer is *Guide to Microcomputers* by Franz J. Frederick

(published in 1980 by the National Institute of Education). The author presents both an in-depth guide to microcomputers and an overview of their use in education. In the publication, the author examines areas such as the components of a hardware system that should be considered, peripherals that may be desirable, service and maintenance needs, programming languages, special applications, and available resources. A review and examination of the book can help the prospective purchaser ask intelligent questions and make a technically informed selection when the final purchase is made.

Several authors suggest that choosing a microcomputer requires considerable time and thoughtful effort. For example, Tony Lobello has written a helpful article—"The Watch Word Is 'Caveat Emptor' "—in the January 1982 edition of *Electronic Education*. In this article, the author stresses that educators need to define carefully the needs that a microcomputer is expected to fill before a purchase is made. In addition, educators must be realistic about the microcomputer's capabilities or else face the possibility of being disappointed once the purchase is completed. Lobello also indicates that educators should do their own "homework" before making a purchase because manufacturers and computer salespersons may not have adequate time or ability to provide thorough information and assistance. He recommends that educators read extensively and talk with other computer users before making a purchase.

Donna Z. Meilach has written a helpful article in the June 1982, issue of *Interface Age*. In an article entitled "Ten Steps to Take Before You Buy a Computer," she outlines specific steps that anyone, including educators, should take before making a purchase. These are to (1) define needs, (2) read computer magazines and books, (3) compile names of local distributors and the systems they sell, (4) visit local showrooms and dealers for hands-on demonstrations, (5) consult with a local computer society or user group (6) enroll in an adult education class, on computers, (7) reevaluate needs, (8) return to stores for a second, more in-depth demonstration, (9) explore financing options, discounts, service and support arrangements, and warranties, and (10) assess limitations of the area in which the computer will be physically located.

In a similar vein, T. L. Poppelbaum's article, "Match Your Computer to Your Needs," in the summer 1981 issue of *On Computing*, offers a discussion on a variety of technical factors that a purchaser should consider: memory size and expansion capacity, keyboard style, location of specific keys, resident language, software available, video displays, TV connection, audio capacities, and graphics (color and resolution). Poppelbaum's article includes an evaluation or weighting tool for microcomputers that can be helpful in the selection process.

A fourth article, written by Betsey Staples, is especially helpful to educators. The article—called "Van Helps Schools Select the Right Computer" in the March 1981 issue of *Creative Computing*—carries a review of a project that was initiated by the Pennsylvania Department of Education. Staples reviews the project itself, but more importantly discusses a booklet that the Pennsylvania state department has produced called "A Guide to Microcomputers." The author includes samples of charts and worksheets from the original booklet designed to help the educator define (1) potential applications for which the microcomputer is useful (e.g., subject areas for which microcomputer applications can be developed, including classroom teacher applications, student applications, media management, and library support and institutional management applications); and (2) the technical features that a system should include. Also in the article is a list of technical questions that should be asked about a hardware system before a purchase is finalized.

There are also other articles that will help educators select and purchase the appropriate microcomputer. The majority of these articles focus on issues and concerns much more specific than those in the resources just described. For example, several authors suggest that software

availability should be a decisive factor in the ultimate selection of a particular brand of hardware. Others focus upon elements such as a microcomputer's limitations, the most appropriate type of retail establishment from which to purchase a microcomputer, the physical location of a computer once it is purchased, and selection of the best peripherals for the computer. Examples of articles that emphasize these themes are as follows.

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- "Let the Buyer Beware: Choosing the Right Computer Store" by Barbara Schwartz in *Personal Computing*, 1, no. 1 (November 1981): 82-84, 86, 88.

- "Choosing Your Personal Computer" by Stan Miastokowski. *Popular Computing* 1, no. 1 (November 1981): 16-18, 20, 22-23.

- "Computer Graphics on a Shoestring" by Frederick J. Kellish. *Instructional Innovator* 26, no. 6, (September 1981): 19-23, 38-39.

- "A Beginner's Guide to Memory," by Elizabeth M. Hughes. *On Computing* 3, no. 1, (Summer 1981): 18-26.

Resources for Teacher and Administrator Inservice Training

Once a school or district has completed the planning and selection processes for the purchase of the microcomputer and actually has the machine on the premises, attention needs to be given to the resources that are available for instructors and staff who are to be trained to use the microcomputer. Attention must also be given to the variety of ways that the microcomputer can be integrated into the educational process. Among the first tasks that an administrator or educator may wish to undertake at this point are to begin acquainting instructors and staff with the capabilities of the microcomputer.

The educator will find that there are many resources that can help in this effort. Using these materials, an individual can assemble a body of information for staff computer awareness and literacy training. Among the materials that may be useful are the following.

- *Classroom Computer News* 1, no. 6 (July-August 1981) Edited by Lloyd R. Prentice, this particular resource could also be used for the selection—planning processes before the microcomputer is purchased. However, it is also an excellent, general purpose guide for computer awareness and literacy training. The entire issue is dedicated to presenting a variety of information for computer-using educators. There is a treatment of hardware selection, an emphasis on the crucial task of software selection, an explanation of various computing languages, and mention of other important resources (e.g., bibliographies, training and educational associations and user groups, schools offering master's-level courses in educational computing, and review of innovative programs.

- *Information Resources On . . . Microcomputers: A Sampling of the ERIC Data Base* from the ERIC Clearinghouse on Information Resources, Syracuse, New York. This is a free, four-page listing of helpful citations under the descriptors: Overview, Computer Literacy, Hardware, Software, Elementary/Secondary Education, and Specific Applications.

- *In Brief . . . Microcomputers: Some Basic Resources*. Marilyn R. Laubacherand available through ERIC Clearinghouse on Information Resources in Syracuse, New York, this is another free, four-page sampling of resources. Included are listings on organizations, journals, books, database references, and suggestions for finding information about specific applications in other schools.

- *Microcomputers and the Media Specialist: An Annotated Bibliography*, by Inabeth Miller. (ERIC Clearinghouse on Information Resources in Syracuse, this source reviews 250 works from recent journals, periodicals, books, and reports.

  This bibliography would be especially useful to the librarian or media specialist who will be ordering instructional or educational materials for the entire school or district. Topic descriptors include General Interest, Educational and Library Application, Computer Literacy; and Future Prospects.

- *Computer-Based Education: The Best of ERIC*, by Keith A. Hall. Again available from the ERIC Clearinghouse on Information Resources.

  This resource treats computer-based education in its broadest sense and does not limit its focus to the microcomputer. However, it is valuable for those wishing to understand the broader context of computer-based education and research out of which microcomputer applications have grown. The document includes annotated bibliographic entries under descriptor headings. New Technology, New Audiences Served, Content Area Applications, Developmental Efforts, Basic Research and Collections of Articles.

Many authors stress the need for schools and districts to provide inservice training for their instructors and administrators. Such training comprises both computer literacy and awareness as well as a deliberate effort to involve as many staff members as possible in the planning, implementation, and evaluation phases of microcomputer use in schools. As expressed in a quote from S. Milner and C. Hargon: (see Milner 1980):

> "While the rewards for using microcomputers can be great, a certain amount of commitment on the part of administrators and teachers for implementing and evaluating computer use is vitally important. The complexity of the technology and relative inexperience of most educators in using microcomputers make this imperative. Moreover, teachers and administrators must recognize how essential inservice training is for effective use of computers in instruction. While the amount of training may vary, some sophistication is necessary. Given the proliferation of microcomputers, unless serious attention is given to upgrading teachers' competencies, students may well become more literate than their teachers." (p. 18)

Traditionally, training teachers and administrators to use and understand the computer, has meant specialized courses in technical programming and computer science. Now, however, the thrust of such training is to teach instructors to: (1) *understand* computer terminology; (2) identify the components of the hardware system; (3) operate the system; (4) identify, select, and

evaluate software (perhaps, how to design and author courseware); (5) *integrate* or apply the computer to their teaching routine; and (6) depending on the subject area, understand (and prepare programs in) one or more of the popular programming languages—(e.g., BASIC, PILOT, PASCAL, COBOL.)

For the educator or administrator who seeks assistance with the design and implementation of inservice training programs that can fulfill these objectives, there are many resources. Among those that may be of value are the following:

- *Teacher Education in the Use of Computers: The Illinois Series of Educational Application of Computers*, by Richard J. Denis, Urbana: Illinois University Department of Secondary Education, 1979. In this publication, the author's concern is focused on preparing educators to teach *with* computers, not to teach others *about* computers.

- *Practicum Activities for Training Teachers to Use Computers: The Illinois Series on Educational Application of Computers*, by Richard J. Denis, Urbana: Illinois University Department of Secondary Education, 1979. This is a somewhat in-depth course model that also focuses on teaching instructors to teach with computers. Course objectives and suggested practicum activities for the course are included.

Several fairly recent articles that are available identify actual course resources, course syllabi, helpful suggestions, and pitfalls to avoid in the design of inservice education courses. Examples of articles in these areas are—

- "Computer Literacy: Finding Effective Resources," by Barbara Kurshan. *Recreational Computing* 9, no. 4 (January-February 1981): 45-47.

- "Teaching the Teachers: An Inservice Syllabus," by Henry F. Olds, Jr. *Classroom Computer News* 2, no. 1 (September-October 1981): 12-15, 40-41.

- "How to Introduce Teachers, Principals and Curriculum Personnel to the Microcomputer," by William D. Hedges. *The Computing Teacher* 8, no. 5 (1980-1981): 45-46.

- "Using Microcomputer Graphics to Train Teachers," by Stanley L. Mathes. *Creative Computing* (April 1982): 88, 90,92, 93, 94.

- "WHATSA Computer? - An Evening Continuing Education Course," by Richard Cornelius. *The Computing Teacher* 9 no. 2 (October 1981): 47-48.

- "Lessons Learned on the Inservice Trail," by Don G. Rawitsch. *Classroom Computer News* 2, no. 1 (September-October 1981): 16-17.

- "Teaching Educators about Computing: A Different Ballgame," by Don G. Rawitsch. *The Computing Teacher* 9 no. 4 (December 1981): 27-31.

- "Making the Transition to Computers Easy: Steps to Take in Inservice Training," by Jo Rykken Johnson. *Educational Computer Magazine* 1 no. 2 (July-August 1981): 16-19.

- "Will Teachers Learn to Program?" by Walter Koetke. *Microcomputing* 6 no. 4 (April 1982): 22-23.

- "Heading Off Hang Ups," by Beth Lowd. *Classroom Computer News* 2 no. 1 (September-October 1981): 8.

- "A Selected Glossary of Terms Useful in Dealing with Computers," by Charles H. Douglas and John S. Edwards in *Educational Technology* XIX no. 10 (October 1979): 56-66.

Resources for Software Identification and Selection

At some point in the process of integrating the microcomputer into the educational process, significant attention must be given to the issue of software selection (and/or development) and evaluation. These issues apply to both instructional and administrative/managerial microcomputer applications. Ideally, some attention was already given to the choice of instructional software during the hardware selection process. However, locating appropriate software will be a constantly recurring task for an educator or administrator. As such, attention to the concerns and issues surrounding software selection is extremely important and warrants special attention.

One of the important issues associated with software is whether to use commercially developed software or to have a school's teachers and administrators develop their own. Whether one or both routes are taken, there are resources available to help the educator.

If a decision is made to use commercially developed software and courseware, there are many vendor listings and directories available to assist educators in their search. Many of the previously cited materials carry appendices listing software vendors. Also, most journals and educational computing periodicals carry advertisements or lists of software vendors. Although there are many controversies surrounding the commercial software industry, many individuals are able to take advantage of these materials. The following citations will assist those who are interested in, or who can take advantage of, the commercially prepared software products.

- *School Microware Directory: A Directory of Educational Software for Apple, Atari, PET and TRS 80*, by Dresden Associates, Dresden, Maine, 1981.

- *The Computerists Directory: the National Phone Book of Computing*, by Alternet, Inc., Fuerneville, California, Spring 1982.

- "Building the Software Collection: Part III," by Ann Lathrop. *Educational Computer* 2 no. 1 (January-February 1982): 16-17, 52-53.

- *Computer Software Resource List*, by the Educational Research Service, Inc., of Arlington, Virginia, 1982.

- *Selected Microcomputer Software*, by Opportunities for Learning, Inc., Chatsworth, California, Fall 1981.

- "Educational Software and Books," by David Lubar. *Creative Computing* 7 no. 10 (October 1981): 54, 56, 59, 60.

Another viable source of software may be programs and packages prepared by other educators or private individuals. There are two, basic ways for administrators and instructors to locate these materials. One is through organizations such as **Computer-Using Educators**, the

Minnesota Educational Computing Consortium, **QUEUE**, and the **Northwest Regional Educational Laboratory** (home of the MicroSIFT Clearinghouse). The other is through programs prepared by individuals and published (along supporting documentation), in periodicals like *BYTE* and *Creative Computing*. For a sample of citations for such programs, see the section entitled "Sample Software Programs" in the Annotated Bibliography of this paper. Many of these programs may need special adaptations for different hardware systems. However, either the program author can be contacted for advice or a local computer-users group or skilled computer science instructor may be able to assist with needed technical alterations. This latter source may be especially appropriate for administrative or computer-managed instructional applications.

If educators choose to use commercially or externally developed software, there are guides and checklists available to help them select software that most appropriately meets their needs. Such materials will also help them evaluate software programs for overall instructional merit. Among the many resources available for this task are the following.

- "Evaluating Instructional Software for the Microcomputer," by Vicki L. Blum Cohen (a paper presented at the annual meeting of the American Educational Research Association in New York, 1982). A copy of this paper can be obtained by contacting the Microcomputing Resource Center at Columbia University's School of Education in New York.

- *Evaluator's Guide for Microcomputer-Based Instructional Packages*, published by the International Council for Computers in Education, Eugene, Oregon 1982.

- *Instructional Software Selection: A Guide to Instructional Microcomputer Software*, by Shirley Douglas and Gary Neights, published by the Pennsylvania State Department of Education, Harrisburg, Pennsylvania, n.d.

- "Making a Case for Software Evaluation," by Molly Watts. *The Computing Teacher* 9 no. 9 (May 1982): 20-22.

If a school's administrators and educators choose to develop their own microcomputer software there is a body of literature that will aid them with this task. Some of these writings will help personnel understand more clearly the factors they need to consider before making this decision (e.g., time and cost that are required for this effort). Others identify, define, and explain actual design and authoring principals that need to be followed in the software authoring process. A complete listing of reference citations can be found in the Annotated Bibliography of this paper (Chapter V) under the description—Software—Design and Development Issues.

Resources for Identifying Potential Applications

One of the remaining considerations that confronts the administrator or educator is to use and apply the microcomputer to instructional and administrative management tasks. For the instructional tasks, in particular, a decision must be made about how to integrate the use of the microcomputer into the regular teaching routine and how to coordinate its use with texts, films, and other materials. There are a variety of aids on this subject that will be helpful to the educator. One such aid is the listing of entries under the general heading *Microcomputer Applications* found in the Annotated Bibliography. From this source, the educator can gain ideas for potential applications and find contact people who may be able to provide practical advice and information. Other similar aids that the educator can use for the development of potential applications are illustrated by the materials identified on the following page.

- *Microcomputer Directory: Applications in Educational Settings*, 2d ed., published by the Harvard University Graduate School of Education in Cambridge, Massachusetts, 1982. This source contains 900 entries that are arranged alphabetically by state. Subject-specific indexes are included (e.g., vocational education, computer-assisted instruction, and administration).

- *Towards a More Effective Technology and Learning: New Directions for Educational Technologies in the 1980s: Research and Studies*, by James W. Botkin et al., published by the International Center for Integrative Studies in New York, September 15, 1980.

- "Science Education: A Bibliography," by Wilbur Parrott. *Classroom Computer News* 2, no. 2 (November-December 1981): 8-9.

Summary

The resources that have been identified and described in this section are but a small sampling of the many helpful reports and articles that are available to the educator interested in microcomputing. They are, however, good sources for pointing the educator in the right direction and referring him or her to yet other references. For the purpose of this section, these citations have at times been arbitrarily assigned to one topical area or another. However, many of them can apply to almost any or all of the areas. The sequence in which the resources were discussed in this chapter may suggest an artificial order to the process of selecting, purchasing, and using a microcomputer. However, many of the tasks or efforts treated separately here actually occur concurrently. The sequence that was developed for the proceeding discussion was, hopefully, not an obstacle for the reader. Those who are at any point in the process of choosing and installing microcomputers will find almost all of the citations useful for one reason or another. The process of selecting, purchasing, and utilizing microcomputers in schools is a fluid one with no set boundaries or compartments. It is hoped that the educator or administrator who uses this and other informational resources will have, and be guided by, a similar perspective when attempting to locate, select, and utilize helpful literature.

CHAPTER II

PERIODICALS AND JOURNALS: A SAMPLE LISTING

The periodicals and journals listed next are representative of the many that are published relating to microcomputers and education. Not all of the publications listed relate directly to education. However, all of them contain information that can be of use to the educator or administrator interested in instructional and managerial microcomputer applications. Additional information about the variety of available publications can be found in the articles and reports cited in the Annotated Bibliography of this report. Also, the source noted below provides valuable information about microcomputer-related periodicals to educators and administrators.

> *A Survey of Selected Computer-Related Periodicals*, by Jim Michelsen. Washington, DC: U.S. Department of Health, Education and Welfare, National Institute of Education, n.d.

This survey lists information for over sixty periodicals. For each one, subscription information, a brief annotation, and publishing frequency are included.

Abstracts-A Computer Program Index Newsletter
National Computer Program Abstract Service, Inc.
P. O. Box 3783
Washington, DC 20007

AEDS Bulletin
Association for Educational Data Systems
1126 16th Street, NW
Washington, DC 20036

AEDS Journal
Association for Educational Data Systems
1126 16th Street, NW
Washington, DC 20036

AEDS Monitor
Association for Educational Data Systems
1201 15th Street, NW
Washington, DC 20036

Association for Computing Machinery Journal
Association for Computing Machinery
1133 Avenue of the Americas
New York, NY 10036

Bulletin of the American Society for Information Science
ASIS
1155 16th Street, NW
Washington, DC 20036

Buss
325 Pennsylvania Avenue, SE
Washington, DC 20003

BYTE: The Small Systems Journal
McGraw-Hill Publications (Peterborough)
70 Main Street
Peterborough, NH 03458

Classroom Computer News
P. O. Box 266
Cambridge, MA 02138

Compukids
1709 West Broadway
Sedalia, MO 65301

Compute and Compute II
625 Fulton Street
Greensboro, NC 27403

The Computerist's Directory
P. O. Box 405
Forestville, CA 95436

Computers and Graphics
Pergamon Press, Inc.,
Journals Division Maxwell House
Fairview Park
Elmsford, NY 10523

Computerworld
International Data Corporation
60 Austin Street
Newton, MA 02160

Computing Reviews
Association for Computing Machinery
1133 Avenue of the Americas
New York, NY 10036

The Computing Teacher
International Council for Computers in Education
c/o Department of Computer and Information Science
University of Oregon
Eugene, OR 97403

Computronics
50 North Pascack Road
Spring Valley, NY 10977

Cursor
P. O. Box 550
Goleta, CA 93017

Creative Computing
39 East Hanover Avenue
Morris Plains, NJ 07950

Desktop Computing
P. O. Box 997
Farmingdale, NY 11737

EC & TJ (Educational and Technology Journal)
Association for Education Communications and Technology
1126 16th Street, NW
Washington, DC 20036

Educational Computer Magazine
(Editorial and Business Office)
104 North Stelling Road
Cupertino, CA 95014

80-US Journal
P. O. Box 7112
Tacoma, WA 98407

Educom Bulletin
Interuniversity Communications Council
Box 364, Rosedale Road
Princeton, NJ 08540

80 Microcomputing
P. O. Box 997
Farmingdale, NY 11737

Electronic Classroom
TEC
150 West Carob Street
Compton, CA 90220

Electronic Learning
Scholastic, Inc.
50 West 44th Street
New York, NY 10036

IBM Journal of Research and Development
Old Orchard Road
Armonk, NY 10504

Information Hotline
Science Associates International
1841 Broadway
New York, NY 10023

Information Society
Crane, Russack & Co., Inc.
3 East 44th Street
New York, NY 10017

Infoworld: The Newsweekly for Microcomputer Users
530 Lytton
Palo Alto, CA 94301

Instructional Innovator
Association for Educational Communication and Technology 1126 16th Street, NW
Washington DC 20036

Interactive Computing
Association of Computer Users
Box 9003
Boulder, CO 80301

Interface Age
16704 Marquardt Avenue
Cerritos, CA 90701

Journal of the American Society for Information Science
American Society for Information Science
1155 Sixth Street, NW
Washington, DC 20036

Journal of the Association for Computer Machinery Communications
Association for Computing Machinery
1133 Avenue of the Americas
New York, NY 10036

Journal of Computer-Based Instruction
Association for Development of Computer-Based Instructional Systems
8120 Perm Avenue, South
Bloomington, MN 55431

Journal of Computers in Mathematic and Science Teaching
P. O. Box 4455
Austin, TX 73765

Journal of Data Education
Society of Data Educators
516 Mark Avenue
Truth or Consequences, NM 87901

Journal of Educational Technology Systems
Society for Applied Learning Technology
Baywood Publishing Company, Inc.
120 Marine Street, Box D
Farmingdale, NY 11735

Journal of Instructional Development
1126 16th Street, NW
Washington, DC 20036

MicroSIFT News
Northwest Regional Educational Laboratory
300 S.W. Sixth Avenue
Portland, OR 97204

Micro: The 6502 Journal
Micro Ink, Inc.
34 Chelmsford, Avenue
Box 6502
Chelmsford, MA 01824

Microcomputer Applications
International Society for Mini and Microcomputers
Acta Press
Box 2481
Anaheim, CA 92804

Microcomputing
80 Pine Street
Peterborough, NH 03458

Peelings II
45 Brook Circle
Las Cruces, NM 88001

Personal Computer Age
Dept. CT
10057 Commerce Avenue
Tujunga, CA 91042

Personal Computing
1050 Commonwealth Avenue
Boston, MA 02215

PET Newsletter
Computer Project
Lawrence Hall of Science
University of California
Berkeley, CA 94270

Popular Computing
Box 272
Calabasas, CA 91302

Popular Computing
70 Main Street
Peterborough, NH 03458

Popular Electronics
Ziff-Davis Publishing Company
1 Park Avenue
New York, NY 10016

Purser's Magazine
P. O. Box 466
El Dorado, CA 95623

Recreational Computing
The People's Computing Company
1263 El Camino Real, Box E
Menlo Park, CA 94025

SoftSide
P. O. Box 68
Milford, NH 03055

Softside
Softside Publications
6 South Street
Milford, NH 03055

Software Digest
EDP Services, Inc.
7620 Turtle Turnpike
Annadale, VA 22003

Software Review
Microform Review, Inc.
520 Riverside Drive
Westport, CT 06880

Softwarenews
Datapro Research Corp.
1805 Underwood Blvd.
Delran, NJ 08075

T.H.E. Journal
Information Synergy, Inc.
P. O. Box 992
Acton, MA 01720

TRS-80 Microcomputer Sourcebook for Educators
Radio Shack
Dept. NR-17
1300 One Tandy Center
Fort Worth, TX 76101

CHAPTER III

SELECTED ORGANIZATIONS RELATED TO MICROCOMPUTERS AND EDUCATION

The organizations and associations listed next are but a representative sampling of the many that can offer assistance to educators and administrators interested in using microcomputers for educational instruction and management. The groups that are included represent educational research concerns, private sector industry associations, a variety of appropriate professional associations, and computer-user groups from around the country. A majority of these organizations publish newsletters and/or journals that carry timely assistance and advice about the field of educational microcomputing. Others conduct and publish research reports. Still others offer help with the practical issues of software, the development and implementation of microcomputer applications, and, inservice and preservice staff training. Space limitations have precluded a comprehensive review of each organization's capabilities and services. Rather, the intent of including this list is to illustrate the variety of groups that can provide help to the educator.

Listings similar to this one, along with more information about each organization's functions, clientele, and objectives, can be found in many of the journals and periodicals cited in the Annotated Bibliography of this report. Additionally, two specific resources will provide a wealth of this type of information to the educator. These are:

Classroom Computer News 1 no. 6 (July - August 1981): 48-62.

This section of the periodical is devoted to annotated listings of organizations and groups active in the field of educational microcomputing. Among the headings included are Educational Associations; User Groups for Educators; From Micros to Mortarboards; Centers; and Sources and Sorcerers.

Colgate, Craig, Jr., ed. *National Trade and Professional Associations of the United States: 17th Annual Edition*. Washington, DC: Columbia Books, 1982.

This source alphabetically lists a wide variety of organizations by title. For each organization, a brief annotation is included about its membership, budget, services and functions, and publications. A topical subject index helps the user locate those organizations that are most appropriate for a given interest area such as computers, data systems, and education.

American Association for Vocational Instructional Materials Engineering Center
Athens, GA 30602
(404) 542-2586

American Association of School Administrators
1801 North Moore Street
Arlington, VA 22209
(703) 528-0700

American Federation of Information Processing Societies, Inc.
1815 North Lynn Street
Arlington, VA 22209

American Industrial Arts Association
1201 Sixteenth Street, N.W.
Washington, DC 20036

American Management Association
135 West 50th Street
New York, NY 10020
(212) 246-0800

American Society for Information Science
1155 16th Street, N.W.
Washington, DC 20036
(202) 659-3644

American Society for Training and Development
P.O. Box 5307
Madison, WI 53705

Apple for the Teacher
c/o Ted Terry
5848 Riddio Street
Citrus Heights, CA 95610

Association for Computer Users (ACU)
P.O. Box 9003
Boulder, CO 80301
(303) 443-3600

Association for Computing Machinery (ACM)
1133 Avenue of the Americas
New York, NY 10036
(212) 265-6309

Association for Educational Communications and Technology (AECT)
1126 16th Street, N.W.
Washington, DC 20036
(202) 833-4180

Association for Educational Data Systems (AEDS)
1201 16th Street, N.W.
Washington, DC 20036
(202) 833-4100

Association for the Development of Computer-Based Instructional Systems (ADCIS)
Bond Hall
Western Washington University Computer Center
Bellingham, WA 98225
(206) 676-2860

Association of Computer Programmers and Analysts
11800 Sunrise Valley Drive H808
Reston, VA 22091
(703) 476-5437

Association of Data Processing Service Organizations
1300 North 17th Street
Arlington, VA 22209
(703) 522-5055

Association of School Business Officials in the U.S. and Canada
720 Garden Street
Park Ridge, IL 60068

Bank Street College
Research Division
610 West 112th Street
New York, NY 10025

Commission on Software Issues in the Eighties
c/o Daniel T. Brooks, Chairman
6106 Lorcom Court
Springfield, VA
(703) 569-6064

Computer-Based Education Research Laboratory
University of Illinois
Urbana, IL 61801

Computer-Using Educators
c/o W. Don McKell
Independence High School
1776 Educational Park Drive
San Jose, CA 95133

Council for Educational Development and Research
1518 K Street, N.W.
Suite 206
Washington, DC 20005

Datapro Research Company
1805 Underwood Blvd.
Delran, NJ 08075
(800) 257-9406

Educational Technology Center
University of California
Irvine, CA 92717
(714) 833-6911

EDUCOM
P.B. Box 364
Princeton, NJ 08540
(609) 734-1915

Graphic Communications Associations
1730 North Lynn Street
Suite 604
Arlington, VA 22209

Human Resources Research Organization (HumRRO)
300 North Washington Street
Alexandria, VA 22314

Information Industry Association
Suite 904
4720 Montgomery Lane
Bethesda, MD 20014
(301) 645-4150

International Association of Word Processing Specialists
Suite 100
1669 South Voss Street
Houston, TX 77057
(713) 820-8555

International Council for Computers in Education (ICCE)
Department of Computer and Information Science
University of Oregon
Eugene, OR 97403

Laboratory for Personal Computers in Education
State University of New York
Stony Brook, NY 11094
(516) 246-8418

Lawrence Hall of Science
University of California
Berkely, CA 94720
(415) 642-3167

Michigan Association for Computer Users in Learning (MACUL)
c/o Wayne County Intermediate School District
33500 Van Born Road
Wayne, MI 48184
(313) 326-9300

Micro Co-Op
P.O. Box 432
West Chicago, IL 60185
(312) 231-0912

MicroSIFT
Northwest Regional Educational Laboratory
500 Lindsay Building
710 2nd Avenue, S.W.
Portland, OR 91204
(503) 248-6974

Microcomputer Center
San Mateo Educational Resources Center Library
333 Main Street
Redwood City, CA 94063
(415) 363-5469

Microcomputer Education Applications Network
256 North Washington Street
Falls Church, VA 22046

Microcomputer Resource Center
Teachers College
Columbia University
New York, NY 10027
(212) 678-3740

Minnesota Educational Computing Consortium (MECC)
2520 Broadway Drive
St. Paul, MN 55113
(612) 376-1101

National Association of Computer Stores
3255 South U.S. 1
Fort Pierce, FL 33450
(305) 465-9450

National Association of Secondary School Principals
1904 Association Drive
Reston, VA 22091

National Audio-Visual Association (NAVA)
3150 Spring Street
Fairfax, VA 22030

National Computer Graphics Association
2033 M Street, N.W.
Suite 330
Washington, DC 20036
(202) 466-5895

National Council of Teachers of English
111 Kenyon Road
Urbana, IL 61801
(217) 328-3870

National Council of Teachers of Mathematics (NCTM)
1906 Association Drive
Reston, VA 22091
(703) 620-9840

National Education Association
1201 16th Street, N.W.
Washington, DC 20036

National Science Teachers Association
1742 Connecticut Avenue, N.W.
Washington, DC 20009
(202) 328-5840

North American Simulation and Gaming Association
Box 100
Westminster College
New Wilmington, PA 16142
(412) 946-8761 (ext. 279)

North Carolina Instructional Computing Project
116 W. Edenton Street
Education Building, Room 58
Raleigh, NC 27611
(919) 733-4695

Northwest Council for Computers in Education
Computer Center
Eastern Oregon State College
La Grande, OR 97850
(503) 963-2171

Ontario Society for Microcomputers in Education
Unit for Computer Science
McMaster University
Hamilton, Ontario, Canada L8S 4K1

School Management Study Group
860 18th Avenue
Salt Lake City, UT 84103
(801) 532-5340

Society for Applied Learning Technology
50 Culpepper Street
Warrenton, VA 22186
(703) 347-0055

Society for Computer Simulation
Box 2228
La Jolla, CA 92038
(714) 459-3888

Society of Data Educators
983 Fairmeadow Road
Memphis, TN 38117
(901) 761-0727

Special Interest Group for Computer Science Education
(A semiautonomous subsidiary of the Association for Computing Machinery)
Math and Computer Science Department
College of William and Mary
Williamsburg, VA 23185
(804) 253-4481

Special Interest Group for Computer Uses in Education
(A semiautonomous subsidiary of the Association for Computing Machinery)
U.S. Coast Guard Academy
New London, CT 06320
(R.T. Close, Chairman)
(203) 444-8350

Special Interest Group on Business Data Processing and Management
(A subsidiary of the Association for Computing Machinery)
1133 Avenue of the Americas
New York, NY 10036
(408) 256-2900

Special Interest Group on Personal Computing
(A semiautonomous subsidiary of the Association for Computing Machinery)
10696 Flora Vista
Cupertino, CA 95014

Special Interest Group on Small Computing Systems and Applications
(A semiautonomous subsidiary of the Association for Computing Machinery)
Digital Equipment Corp.
ML 3-4/TSO
146 Main Street
Maynard, MA 01754
(617) 897-5111

Texas Computer Education Association
7131 Midbury
Dallas, TX 75230
(214) 361-9472

Word Processing Society
Box 92553
Milwaukee, WI 53202
(414) 784-3900

CHAPTER IV

SAMPLE LISTING OF SOFTWARE VENDORS

The listing of software vendors that follows is but a sampling of the many companies that produce educational courseware for the microcomputer. The list can be used as a beginning reference point for those educators interested in obtaining software. Many of the companies will provide, free upon request, listings of their courseware materials. Others regularly publish a comprehensive catalog for which there is a charge. Many of the articles and reference works included as part of the Annotated Bibliography of this report contain similar lists of software vendors. Also, a majority of the periodicals related to educational computing and general microcomputer applications (e.g., *Popular Computing*, *BYTE*, or *Educational Computer Magazine*), contain advertisements and/or listings of software vendors.

The educator searching for software will need to keep in mind both the applications for which material is needed and the hardware that is available. If possible, some consideration should be given to software before hardware is purchased. Then, lists such as the following one which include local-area computer stores, publications carrying regular software reviews, and evaluations can be used as sources to locate appropriate software. For many educational applications, (especially those in vocational education), educators may have to turn to noncommercial sources for software. There is a need for vocational educators to share information about courseware and special microcomputer activities they are conducting. Some informational exchanges are already beginning to occur. Several state departments of education and vocational education have designated key staff persons to locate and disseminate information about software development and availability within their states. This type of effort needs increased attention and support from all educational sectors. Until this occurs, however, location of appropriate software can be timeconsuming and problemmatic. The following list, along with suggestions included in Appendix A—Identification and Selection of Resources—can be of assistance for the present.

Abbott Educational Software
334 Westwood Avenue
East Longmeadow, MA 01028
(413) 525-3462

Acorn Software Products
634 North Carolina Avenue, S.E.
Washington, DC 20003
(202) 544-4259

Adventure International
P.O. Box 3435
Longwood, FL 32750
(305) 862-6917

Alternate Source
1806 Ada Street
Lansing, MI 48910
(517) 487-3358

American Analysis Corporation
655 Redwood Highway
Mill Valley, CA 94941

Apple Computer Company
10260 Bandley Drive
Cupertino, CA 95014
(408) 996-1010

Applied Educational Systems
RFD #2, Box 213
Dunbarton, NH 03301
(603) 774-6151

Applications
21650 W. Eleven Mile Road
Suite 103
Southfield, MI 48076

Atari
call (800) 538-8547 for name
of nearest dealer

Robert R. Baker, Jr.
5845 Topp Court
Carmichael, CA 95608

Basics & Beyond
P.O. Box 10
Amawalk, NY 10501
(914) 962-2355

BCD Associates, Inc
1216 North Blackwelder
Oklahoma City, OK 73106
(405) 524-7403

Bell & Howell Micro Systems
Audio Visual Products Division
7100 North McCormick Road
Chicago, IL 60645
(312) 262-1600

Betamax, Inc.
101 Nickerson Street
Suite 550
Seattle, WA 98109
(206) 282-6249

Borg-Warner Educational Systems
600 West University Drive
Arlington Heights, IL 60004
(800) 323-7577

The Bottomshelf, Inc.
P.O. Box 49104
Atlanta, GA 30359

Business Microproducts
1838 Catalina Court
Livermore, CA 94550

Carta Associates, Inc.
640 Lancaster Avenue
Frazer, PA 19355
(215) 647-9600

Cavri Systems
26 Trumbull Street
New Haven, CT 06511
(203) 562-9873

Comaldor
25 Sunrise Avenue #1108
Toronto, Ontario, Canada M4A 2S2
phone: 751-7481

Comm Data Systems
P.O. Box 325
Milford, MI 48042
(313) 685-0113

Commodore Business Machines
(contact local Commodore dealer)

COMPress
P.O. Box 102
Wentworth, NH 03282
(603) 764-5831

Computer Business Systems of Myrtle Point
1707 Viewpoint
Myrtle Point, OR 97458
(503) 572-3841

Computer Information Exchange
P.O. Box 159
San Luis Rey, CA 92068
(714) 757-4849

Computrex Computer Services
P.O. Box 536
Inman, SC 29349

Conduit
P.O. Box 388
Iowa City, IA 52244
(319) 353-5789

Cook's Computer Company
1905 Bailey Drive
Marshalltown, IA 50158

Courseware Magazine
4919 North Millbrook #222
Fresno, CA 93726
(209) 225-0953

Cow Bay Computing
Box 515
Manhasset, NY 11030

Creative Computing Software
Department 301
P.O. Box 789M
Morristown, NJ 07960
(201) 540-0445

Curriculum Applications
P.O. Box 264
Arlington, MA 02174

Dallas Public Schools
Marketing Department
912 South Ervay
Dallas, TX 75201
(214) 742-7991

Delmarva Computer Club
P.O. Box 36
Wallops Island, VA 23337

Demi-Software
6 Lee Road
Medfield, MA 02052

Desert Sound
16268 Main Street
Hesperia, CA 92345
(714) 244-2555

Duxbury Systems, Inc.
77 Great Road
Acton, MA 01720
(617) 263-7761

George Earl
1302 South General McMullen
San Antonio, TX 78237

Educational Activities, Inc.
P.O. Box 392
Freeport, NY 11520
(516) 223-4666

Educational Courseware
Ten Bay Street
Design 66
Westport, CT 06880

Educational Microsystems, Inc.
P.O. Box 471
Chester, NJ 07930
(201) 879-5982

Educational Programs
P.O. Box 2345
West Lafayette, IN 47906
(317) 463-4778

Educational Services Management
P.O. Box 12599
Research Triangle Park, NC 27709
(919) 781-1500

Educational Software Corp.
414 Rosemere
Maquoketa, IA 52060

Educational Software and Design
P.O. Box 2801
Flagstaff, AZ 86003

EduTech
50 Putnam Street
West Newton, MA 02165
(617) 965-4813

Edutek Corp.
P.O. Box 11354
Palo Alto, CA 94306
(415) 325-9965

Edu-Ware
P.O. Box 336
Maynard, MA 01754

Edu-Ware Services, Inc.
22222 Sherman Way
Suite 102
Canoga Park, CA 91303
(213) 346-6783

Ellis Computing
600 41st Avenue
San Francisco, CA 94121
(415) 751-1522

Fireside Computing, Inc.
MicroGnome Division
5843 Montgomery Road
Elkridge, MD 21227
(301) 796-4165

Gentech Corp.
4101 N. St. Joseph Avenue
Evansville, IN 47712
(812) 423-4200

Goforth Microcomputing
329 22nd Street East
Prince Albert, Saskatchewan, Canada S6V IN3
(306) 763-8323

J. L. Hammett
P.O. Box 545
Hammett Place
Braintree, MA 02184

Hartley Courseware, Inc.
P.O. Box 431
Diamondale, MI 48821
(616) 942-8987

Hayden Book Company
50 Essex Street
Rochelle Park, NJ 07662
(800) 631-0856

High Technology Software Products, Inc.
P.O. Box 14665
Oklahoma City, OK 73113
(405) 840-9900

Houghton Mifflin Company
One Beacon Street
Boston, MA 02107
(617) 725-5000

Ideatech
P.O. Box 62451
Sunnyvale, CA 94088

Indian Head Software
1002 Indian Head Drive
Snow Hill, NC 28580
(919) 747-2839

Instant Software
Peterborough, NY 03458
(800) 258-5473

Instructional Development Systems
2927 Virginia Beach Blvd.
Virginia Beach, VA 23452
(804) 340-1977

International Micro Systems
8425 Quivara Road
Lenexa, KS 66215
(913) 888-8330

Interpretive Education
2306 Winters Drive
Kalamazoo, MI 49002
(616) 345-8681

Jem Research
Discovery Park
P.O. Box 1700
University of Victoria
Victoria, BC Canada V8W 2Y2

Jensen Software
1440 Rockway
Lakewood, OH 44107

Krell Software
21 Millbrook Drive
Stony Brook, NY 11790
(518) 751-5139

Library Software
P. O. Box 23897
Pleasant Hill, CA 94523

Little Bee Educational Programs
P.O. Box 262
Massillon, OH 44648
(216) 832-4097

Charles Mann & Associates
Microcomputer Division
55722 Santa Fe Trail
Yucca Valley, CA 92284
(714) 365-9718

Mastertype
P.O. Box 5223
Stanford, CA 94305

Math City
4040 Palos Verdes Drive North
Rolling Hills Estates, CA 90274
(213) 541-3377

Math Software
1233 Blackthorn Plaza
Deerfield, IL 60015

McGraw-Hill
1221 Avenue of the Americas
New York, NY 10029
(212) 997-1221

Med Systems Software
P.O. Box 2674-D
Chapel Hill, NC 27514
(919) 933-1990

Mega-byte Systems
66 Church Street
Ellenville, NY 12428
(914) 647-4235

Mentor Software, Inc.
P.O. Box 791
Anoka, MN 55303

Merlan Scientific
P.O. Box 25
Depew, NY 14043
(416) 877-0171

Microcomputer Education Applications Network
256 N. Washington Street
Falls Church, VA 22046
(702) 536-2310

Microcomputer Software Systems
4716 Lakewood Drive
Metairie, LA 70002

MICRO-ED, Inc.,
P. O. Box 24156
Minneapolis, MN 55424
(612) 926-2292

micro lab
811 Stonegate Drive
Highland, Park, IL 60035
(312) 433-7877

Micro Learningware
P. O. Box 2134
North Mankato, MN 56001
(507) 625-2205

Microphys
2048 Ford Street
Brooklyn, NY 11229
(212) 646-1040

Micro Power & Light
13773 North Central Expressway
Dallas, TX 75243
(214) 234-8233

Micropute Software
P. O. Box 1943
Rock Mount, NC 27801

Microsoft Consumer Products
10800 North East Eighth
Bellevue, WA 98004
(206) 454-1315

Milliken Publishing Company
1100 Research Boulevard
St. Louis, MO 63132
(314) 991-4220

Milton-Bradley Company
Shaker Road
E. Longmeadow, MA 01028
(413) 525-6411

Minnesota Educational Computing Consortium Publications
2520 Broadway Drive
St. Paul, MN 55113
(800) 631-8112

Mosaic Electronics
P. O. Box 748
Oregon City, OR 97045

MUSE Software
330 North Charles Street
Baltimore, MD 21201
(301) 659-7212

NCCD (National Coordinating Center for Curriculum Development)
State University of New York
Stony Brook, NY 11794
(516) 246-8418

National Software Marketing
4701 McKinley Street
Hollywood, FL 33021
(305) 625-6062

OMNICO Computer Associates
3300 Buckeye Road
Atlanta, GA 30341

Petsoft
Radclyffe House
66-68 Hagley Road
Birmingham, England B16 8PF

Program Design, Inc.
11 Idar Court
Greenwich, CT 06830
(203) 661-8799

Programs for Learning, Inc.
P. O. Box 954
New Milford, CT 06776

Project COMCAL
Commack Public Schools
Hauppage Road
Commack, NY 11725

Project LOCAL Software
c/o Dresden Associates
P. O. Box 246
Dresden, ME 04342
(207) 737-4466

Quality Educational Designs
P. O. Box 12486
Portland, OR 97212
(503) 282-4906

Radio Shack - sold through local
Radio Shack retail outlets

Rainbow Micro Software
1650 Piikea Street
Honolulu, HI 96818
(TRS-80 Programs)

Scharf Software Services
P. O. Box 18445
Irvine, CA 92713
(714) 557-9206

School Microware
P. O. Box 246
Dresden, ME 04342
(207) 737-4466

Science Research Associates
155 North Wacker Drive
Chicago, IL 60606
(800) 621-0664

Shafer Software
465 South Mathilda Avenue, Suite 202
Sunnyvale, CA 94086
(408) 730-0179

Sheridan College
c/o F. Winter
1439 Trafalgar Road
Oakville, Ontario
Canada L6H 2L1
(416) 845-9430

The Software Exchange
6 South Street, Box 68
Milford, NH 03055
(603) 673-5144

Software Industries
902 Pinecrest
Richardson, TX 75080

Special Delivery Software
10260 Bandley Drive
Cupertino, CA 95014
(408) 996-1010

Stoneware Microcomputer Products
1930 Fourth Street
San Rafael, CA 94901
(415) 454-6500

The Teaching Assistant
22 Seward Drive
Huntington Station, NY 11746

Teaching Tools
P. O. Box 12679
Research Triangle Park, NC 27709
(919) 851-2374

T.H.E.S.I.S.
P. O. Box 147
Garden City, MI 48135
(313) 595-4722

3R Software
P. O. Box 3115
Jamaica, NY 11431

Teacher's Pet
c/o Glenn Fisher
1517 Holly Street
Berkeley, CA 94703

Time Share Corp.
Hanover, NH 03775
(603) 488-3838

Tycom Associates
68 Velma Avenue
Pittsfield, MA 01201
(413) 442-9771

TYC Software
40 Stuyvesant Manor
Geneseo, NY 14454
(716) 243-3005

Unicom Division of United Camera
297 Elmwood Avenue
Providence, RI 02907

Westinghouse Learning Corp.
5005 West 110th Street
Oak Lawn, IL 60453

Whitney Educational Services
2071 Tenth Avenue
San Francisco, CA 94116

CHAPTER V

THE ANNOTATED BIBLIOGRAPHY

Introduction

This bibliography is designed for those individuals who would like additional readings and resources related to varied aspects of educational microcomputing. The sources cited here will be of interest to all those involved with educational microcomputing whether they be classroom instructors or policymakers. However, the citations have been chosen for and directed toward practitioners as opposed to researchers and theoreticians. This choice has been made for two reasons.

First of all, the existence of theoretical and research literature related to the educational use of microcomputers is limited. The creation of the microcomputer itself and its use in education are recent phenomena. Because of its low cost and the fact that many school districts can afford the microcomputer, purchases are being made and applications are being designed without the benefit of research as such. Indeed, the practice of using microcomputers is developing concurrently with (and at times, ahead of) research and theory. The phenemonon of microcomputer use in education has differed somewhat from other developments in educational technology. Rather than progressing from the top down (with universities and academicians discovering a technique or tool and educating the field in its use), the introduction of microcomputers is a from-the-bottom-up occurrence. This means that the microcomputer usually enters the classroom from the level of the local community, often through the efforts of a single teacher in a school or a group of parents who have already purchased microcomputers for their sons and daughters at home. As a result, theory and research on the use of microcomputers are growing out of actual classroom practice rather than practice growing out of theory and research.

Secondly, due to the newness of microcomputers and the lack of a large body of existing literature governing and documenting both benefits and limitations of their use, there is a need for the type of literature cited in this bibliography. It should be noted that there is not a lack of research regarding the use of computers for instructional delivery. However, much of the literature to date on computer-assisted instruction (CAI) and computer-managed instruction (CMI) has focused on the larger, more costly mainframe and minicomputers. These computers offer a different variety of capabilities to the school district and classroom instructor than do microcomputers. Consequently, while research studies related to the larger machines can be helpful, those currently involved with microcomputers in the educational environment have informational needs that are not met through studies on the larger computers.

The variety of bibliographic citations included here is designed to meet the informational needs of those educators who are now (or soon will be) involved with microcomputers in their schools and classrooms. Many of the entries cut across secondary and two-year postsecondary institutions as well as academic and vocational settings. This is because a large number of issues

and concerns about educational microcomputers cannot be segregated by grade level or institution. For example, certain issues and concerns surrounding the use of microcomputers for instructional delivery or institutional management apply to all educational environments. Likewise, certain procedures related to the selection, design, and evaluation of software are germane to most learning situations, whether they be vocational or nonvocational. Also, procedures relating to (and problems arising from) the selection, implementation, and use of the microcomputer for educational purposes are common to a majority of educational settings. The big differences surrounding microcomputer use in secondary or postsecondary, vocational, or nonvocational settings come at the *application* level (i.e., the specific way that a microcomputer is applied to a given educational or classroom situation). Thus an educator, whether a policymaker or a classroom instructor, has informational needs that are both general (usually shared by a broad spectrum of the educational community) and specific (frequently of interest to and applicable for a limited number of educators). The entries cited here address educators' needs on both levels.

The bibliography itself has five major sections. These are (1) "Microcomputers and Education: General Issues and Concerns," (2)" Software" (3) "Microcomputer Applications" (4) "Resources for Educational Microcomputing" and (5) "Microcomputers and the Future." A brief definition and description of each section follows.

The first section, "Microcomputers and Education: General Issues and Concerns" includes three major types of citations. One group relates to "Current Trends and Practices," a second to "Instructional Delivery and Management" and a third to "Institutional Management." Generally, these entries look at (1) how the microcomputer is used in education (2) whether it should be used (3) benefits and limitations resulting from its use (4) what the microcomputer's role is and can be in the classroom and (5) the potential inherent within the microcomputer for management and administrative tasks. The entries identify major issues within each of the three subject areas, needed points of further study and research, and broad questions that educators (i.e., instructors and administrators) should consider.

The second section focuses exclusively on "Software." Citations are grouped according to three topical headings—"General Issues", "Design and Development Issues" and "Selection and Evaluation Procedures." Software (or rather the lack of quality software) is consistently cited throughout the literature as the major impediment to realization of the microcomputer's full potential as a classroom tool. This section, in part, examines the software controversy in some detail. Entries under the "General Issues" part of this section generally explore the current status of the software industry, criticisms that educators level at the industry, and the role of software simulations and games in the instructional process. Under the heading "Design and Development Issues," entries that will assist those who wish to develop and design their own educational software are included. The third group of entries (those under "Selection and Evaluation Procedures") will help educators develop selection and evaluation criteria tailored to their own needs and situations.

The entries in the third section, "Microcomputer Applications" are grouped under four topical headings: (1) "General Use Surveys" (2) "Instructional (Vocational Applications)" (3) Instructional (NonVocational Applications)" and (4) "Institutional Management." Citations under the first heading, "General Use Surveys," provide a "broad-brush," general idea of how microcomputers are used in schools and school districts around the country. Generally, in addition to information about applications themselves, data are included on technical assistance needs, anticipated future applications, costs, and hardware identification. Citations in each of the other three sections are generally descriptions and reviews of specific and varied microcomputer applications in schools around the country. Each entry generally includes a description of the

application, major benefits and pitfalls of the application, some mention of hardware and software used, and contact information useful for others wanting to replicate the application. These three groups of entries can be a rich source of ideas and considerations for educators who are developing microcomputer applications in their own schools.

The citations included under the fourth major section, "Resources for Educational Microcomputing," are reference aids that educators can utilize for additional information about specific aspects of educational microcomputing. For convenience, the entries have been subdivided into numerous smaller categories. These include (1) "General Purpose Resources" (2) "How to Select a Microcomputer" (3) "Software Selection Guides" (4) "Teacher and Inservice Education" (5) "Bibliographies, Databases and Directories" (6) "Sample Hardware Reviews" and (7) "Sample Software Programs." The general purpose entries, for the most part, provide a broad overview of microcomputers and the field of microcomputing itself. Most of the entries are written in easy-to-understand, nontechnical language. Citations under the microcomputer selection section will aid administrators and others who must select and purchase a microcomputer for their school or district. The software selection entries offer several sources that educators can refer to in their search for courseware and instructional materials. Teacher and inservice education resources are special citations that are useful for school, district, or state level administrators who are responsible for planning and implementing computer awareness and literacy programs for instructors. Entries under the last two headings—Sample Hardware Reviews and Sample Software Programs—are only included as examples of the kind of specific information that is available about various hardware systems and software programs. The software program citations may be especially helpful to educators who are designing their own programs for microcomputer applications in their schools and classrooms.

The fifth and last major section, "Microcomputers and the Future," has entries grouped under three categories. These are (1) "General Educational Issues" (2) the "Working Environment" and (3) Technology for Education. The citations grouped under these issues examine briefly (1) the impact that microcomputers and other technology may exercise upon the future delivery of education and training, (2) employment and labor market shifts that may occur as a result of microcomputers and microprocessors in the work place, and (3) specific instructional tools that are forthcoming on the educational horizon.

Most of the citations included in the bibliography are from the time period of January 1979 to July of 1982. They are the result of several computerized and manual bibliographic searches that focused on educational computing journals, vocational education and training journals, popular and technical computing journals, and miscellaneous monographs, project reports, books, and conference proceedings. The educational focus of the searches. (especially for the applications section) was vocational training at the secondary and postsecondary levels (e.g., two-year community and technical colleges). Even though much activity in microcomputing is occurring in higher education—especially in engineering and the sciences—this level was not germane to the work of this project. On a final note, even though the citations are subdivided into specific categories, several of the sections are interrelated and should be examined in relation to one another. As an example, the entries in the "Microcomputer Applications" section are complementary to those in the first section on "Microcomputers and Education" Similarly, entries under "Resources, Bibliographies, Data Bases and Directories," will supplement those found under almost any other section.

Microcomputers and Education: General Issues and Concerns

Current Trends and Practices

Anderson, Cheryl A. *Microcomputers in Education.* Austin, TX: University of Texas at Austin, 1980.

> The author presents an overview of microcomputer technology and reviews its general applicability to education. She writes that the microcomputer is ushering in a revolution: one that will be so pervasive that an individual who is not familiar and comfortable with computer technology will be rendered virtually obsolete in the office, home, and school. She touches upon the software problem, general criteria to consider for hardware purchases, and resources that are available to the educator.

Braun, John Seely, and Goldstein, Ira. "Computers in a Learning Society." Testimony given before the House Science and Technology Subcommittee on Domestic and International Planning, Analysis, and Cooperation, Washington, DC: October 13, 1977.

> The authors comment upon emerging general developments in computer technology (e.g., design of intelligent instructional systems and the provision of problem solving capabilities within the computer). They suggest that there are applications of this technology for education (e.g., potential transformation of technical education with the computer acting as a coach), including both educational evaluation and in-home educational uses of computers.

Bork, Alfred. "Computers and Learning: Ronald Reagan's Biggest Mistake." *Educational Technology* XXII, no. 6 (June 1982): 25-26.

> The author traces recent funding patterns for science education at the National Science Foundation. He said that in recent years, these funds were concerned with research and development in computer-based learning. In most recent funding rounds, the budget for these programs was cut drastically. The author writes about the negative, long-term effect these cuts will exercise upon this country's technological future.

Botterell, Art. "Why Johnny Can't Compute." *Microcomputing* VI, no. 4 (April 1982): 146-150.

> The author closely examines various reasons why the computer has not yet achieved its complete potential in the educational field. Then, he posits a variety of positive educational impacts that computers can have in the future, given that social and political obstacles can be overcome.

Braun, Ludwig, "Computers in Learning Environments: An Imperative for the 1980s." *BYTE* 5, no. 7 (July 1980): 7-8, 10, 108, 110, 112, 114.

> The author examines briefly the reasons why computers have largely played a minimal role in education. He then goes on to offer reasons why the U.S. educational system needs computers and offers recommendations for increasing the role that computer technology plays in education.

"Citizen's Committee Attacks Use of Computers to Teach Basic Skills." *Educational Technology* XXII, no. 6 (June 1982): 7-9.

The article is about the formation of a Citizen's Action Committee in California to halt the widespread (and according to them, needless) purchase of computers for the classroom. A summary of the group's positions and objections to computers in the classroom is presented. A copy of their position paper is included.

Deringer, Dorothy K. "The New Federalism: A Do-It-Yourself Approach to Computers in Education." *Technological Horizons in Education Journal* 9, no. 4 (May 1982): 90-94.

The author has informally divided the article into two sections. The first examines the role of the National Science Foundation vis a vis funding for precollege mathematics programs. The second focuses on the present and future of educational computing in the U.S. She compares U.S. computer education with that of other countries and explores the potential role of federal, state, and local authorities in furthering U.S. programs.

Hall, Gene E. *Issues Related to the Implementation of Computers in Classrooms: Where to Now?* Austin, TX: Research and Development Center for Teacher Education, 1981.

Author presents a synthesis and review of papers presented at a National Institute of Education Conference on "Issues Related to the Implementation of Computer Technology in Schools." The author reviews the conference process itself, describes selected findings from research on change that are useful when discussing implementation of microcomputers in the classroom and presents recommendations for "next steps" to consider when implementing microcomputers in the schools.

Klassen, Daniel; and Solid, Myron. "Toward an Appropriate Technology for Education." *Educational Technology* XXI, no. 10 (October 1981): 23-31.

The authors raise the question of whether the microcomputer is today an appropriate technology for schools. They say that given the style of educational software, the current generation of microcomputers is an intermediate step. The article is composed of questions that the authors ask and conclusions they draw regarding the educational appropriateness of microcomputers.

Kurz, Constance, and Joch, Thomas. "Education Schools Scrambling to Catch Up with the 'Microcomputer Revolution'." *Education Week* no. 32 (May 1982): 1, 16-17.

The authors state that with varied degrees of enthusiasm, schools are coming to grips with the microcomputer revolution. They say, however, that because of the rapid and recent advent of microcomputers, many teachers are not equipped with needed skills to adequately use the machines. The authors explore the type of teacher education that is both needed and adequate to prepare them to meet this challenge.

Long, Sandra M. "The Dawning of the Computer Age: An Interview with Ronald Palamara." *Phi Delta Kappan* 63, No. 5 (January 1982): 311-313.

The article is an interview with Ronald Palamara, an ex-educator who has founded his own computer services firm. He answers questions about the social effects computers will have in the future especially in education) and conjectures about employment gains and losses that can be expected.

Luehrmann, Arthur. "Computer Illiteracy—A National Crisis and a Solution for it." *BYTE* 5, no. 7 (July, 1980): 98-99, 101-102.

The author says that there is a drastic need for the American public to become conversant and experienced with computers. He examines student and adult needs for computer literacy and applied experience. He considers current obstacles impeding widespread training and offers advice for adults who seek computer education.

Mace, Scott. "California Considers Technological Education Program." *InfoWorld* 7, no. 26 (July 1982): 30-31.

The author writes about a bill before the California legislature to fund the Investment in People Program. The bill is designed to help the state's schools meet the technological demands of the 1980s. A variety of components comprise the bill: teacher training, individualized instruction, teacher education centers, retraining of state's citizens, and vocational funding for high technology training programs.

Melmed, Arthur S. "Information Technology for U.S. Schools." *Phi Delta Kappan* 63, no. 5 (January 1982): 308-311.

The author accounts for some of the factors that may be shaping this country's computer courseware industry.

Melmed, Arthur I. and Steiht, Thomas G. Statement of National Institute of Education activities, from *Computers and the Learning Society: Hearings Before the Subcommittee on Domestic and International Scientific Analysis and Cooperation of the Committee on Science and Technology.* Report Number 47. Washington, DC, Congress of the United States, 1978.

This was testimony offered before a congressional subcommittee regarding the National Institute of Education's outlook on the use of computers for educational purposes. The programs and research of the Institute related to educational computing and technology are described.

"Microcomputers: New Wave in School Practice and Education Research." *Wisconsin Center for Education Research: News* (Fall 1981 - Winter 1982): 1-4.

According to the article, microcomputers are becoming quite popular in the nation's schools. Before they can live up to their reputation, however, research and development efforts are needed. The article suggests several issues and areas that need closer study.

Molnar, Andrew. "The Challenge of the 1980s: Computer Literacy." In *Microcomputers in Education: Getting Started*, edited by Nancy A. Watson, Tempe, Arizona State University, College of Education, January 1981.

The author asks whether the United States' educational system is preparing students for the world in which they live. He compares our experience with computer and technological education with that of other countries. He suggests that our country needs to be doing much more—that we need to think about including computer literacy and skills with our definition of "basic skills."

Mosow, David K. and Rice, Dale R. "Dawn of a New Age?: The Microcomputer in the Schools of the 80s." *Educational Computer Magazine* 1, no. 4 (November-December 1981): 44-46, 48.

The authors write that with the advent of microcomputers, both home and educational computers are becoming more commonplace. As a result, they state that in the 1980s, the microcomputer will alter the way in which subjects are taught and pupils learn. The article examines these changes and the instructional support base that is needed to usher in these changes.

NEA Special Committee on Instructional Technology Report. Washington, DC: National Education Association Instruction and Professional Development, 1981.

This report gives an overview of the National Education Association's (NEA) activities and concerns regarding instructional technology and provides a review of NEAs continuing involvement with instructional technology. The special committee that prepared the report was responding to a call to investigate the impact of recent advances in instructional technology and to make recommendations, if appropriate, in the use of such technology.

Nasman, Leonard O. "Computers Mean New Decisions." *Voc Ed* 57, no. 3 (April 1982): 37-38.

The author examines the question of how vocational educators should deal with current issues related to microcomputers. He reviews five areas where the microcomputer can have a major effect upon vocational education. For each of these, he outlines a separate set of issues and concerns that vocational educators must confront.

Needle, David. "Group Fights Growing Use of Microcomputers in Schools." *InfoWorld* 4, no. 18 (May 1982): 1, 7.

The author reports on the efforts of a "citizen's action committee" aimed at halting the bandwagon effect initiated by the microcomputer industry to place a microcomputer in every classroom. The article reviews the group's concerns and objectives.

Pogrow, Stanley. "On Technological Relevance and the Survival of U.S. Public Schools." *Phi Delta Kappan* 63, no. 9 (May 1982): 610-611.

The author writes that massive environmental changes will be occurring. These changes will require that schools provide extensive technological training regardless of educators' desires or capacities to do this. He identifies these changes, the impositions they are likely to place on education, and the formidable obstacles that may interfere with education's response.

Robinson, Sharon P. "Questions for Teachers: Micromachines Raise Macroissues of Power and Principle in Education." *Today's Education* 71, no. 2 (April-May 1982): 27-28.

In the article, the author raises the issue of how educators, schools and society are going to use computer technology. She perceives that the issues raised will quickly move beyond the usual social, economic, and political domain and will focus widespread attention on purposes, processes, and problems of American education. She examines questions of control, power, and process regarding education's response to computer technology.

Shane, Harold G. "The Silicon Age and Education." *Phi Delta Kappan* 63, no. 5, (January 1982): 303-308.

The author writes that schooling and education have done relatively little to prepare individuals for the emerging information society. The ability of education to do this, he

writes, will prove to be education's greatest task and responsibility for the next two decades. He reviews the tasks and responsibilities facing education.

Sheingold, Karen. *Issues Related to the Implementation of Computer Technology in Schools: A Cross-Sectional Study*. Children's Electronic Laboratory Memo No. 1. Washington, DC: U.S. Department of Health, Education and Welfare, National Institute of Education, February 1981.

The author raises the issue of whether a revolution is occurring in education with the advent of microcomputers. Using a case study methodology, she examines how microcomputers were being used and implemented in three different school systems. The paper is a summary of her study and the emerging educational issues that she identified during the course of her work.

Sturdivant, Patricia. "Microcomputers—Promoting Their Use in Elementary and Secondary Schools. In a *Gateway to the Use of Computers in Education*. Proceedings of the Annual Convention of the Association for Education Data Systems, St. Louis, MO: Association for Educational Data Systems,1980: pp. 200-206.

The author provides a general discussion of microcomputer technology and a review of various ways in which microcomputers are being used in education. She then examines the advantages microcomputers offer to education and considerations that are important in hardware and software selection.

Taylor, Robert P. ed. *The Computer in the School: Tutor, Tool, Tutee*. New York: Teachers College Press, Columbia University, 1980.

This book is a collection of essays that were written by five leaders in educational computing during the 1970s. Works by the following authors are included: Alfred Bork, Thomas Dwyer, Arthur Luehrman, Seymour Papert, and Patrick Suppes.

Tinker, Robert F. "Guest Editorial." *The Computing Teacher* 9, no. 5, (January 1982): 4-5.

The author writes that the introduction of microcomputers to education raises important issues of equity. He cites two equity issues: (1) inequity between schools that can and cannot afford microcomputer purchases, and (2) the number of males learning to use computers far exceeds the females. He writes that issues like these require a more planned, approach when microcomputers are used in the schools.

Wagner, William J. "The Story of Computer-Using Educators." *Recreational Computing* 9, no. 3. (November-December 1980): 24-25.

The author says in the article that today's computer users have little technical expertise and a sparse programming background. He states that average teachers and administrators who will implement new curricula with microcomputers knew little about computers even six months ago. He explores the type of training that the educators need and the design of a system to deliver the training.

Winkle, Linda Wyreck, and Matthews, Walter M. "Computer Equity Comes of Age." *Phi Delta Kappan* 63, no. 5, (January 1982): 314-315.

The authors' main concern is with equity in computer learning and skill development. Particular persons that they mention as needing special attention are females. The authors

examine inhibiting factors that cause females to be more reticent in learning to use computer technology comfortably.

Zakariya, Sally Banks. "The Computer Goes to School." *Principal* 61, no. 5 (May 1982): 16-19, 52-54.

The author summarizes a conference on the role of microcomputers in education held at Racine, Wisconsin. The participants discussed (1) the issues of why microcomputers are important, (2) how to handle the problem of inadequate software, (3) how to provide inservice training to teachers and administrators, and (4) the role that the school principal has in the selection and implementation of microcomputers for classroom use.

Zinn, Karl L., and Baret, Bernard. "DATASPAN: Getting Information and Advice to Where it Does the Most Good." *The Computing Teacher* 8, no. 7 (1980-1981): 21-24.

The author writes that there needs to be more dissemination and sharing of information among local-level microcomputer-using educators. In this article, he outlines and explains a model of a program he has designed for this purpose.

Instructional Delivery and Management

Allen, Michael. "Computer-Managed Instruction." *Journal of Research and Development in Education* 14, no. 1 (Fall 1980): 33-40.

The author explains distinctions between computer-assisted (CAI) and computer-managed (CMI) instruction and says that many people in the field of computer-based instruction do not recognize the importance of CMI. However, some researchers and developers of CMI perceive it to be the backbone of many educational successes and innovations. He explores specific ways that CMI can be used, recommends areas of needed CMI research, and posits future educational innovations using CMI.

Bagelay, Carole A., Hansen, Thomas; and Klassen, Daniel S. "Is TCI (Total Computer Instruction) the Answer to Educational Problems?" In *Proceedings of the Annual Convention of the Association for the Development of Computer-Based Instructional Systems*. San Diego, CA: Association for the Development of Computer-Based Instructional Systems, 1979: Volume I, pp. 212-218.

The authors explore two issues in their paper: (1) whether the computer (including the microcomputer) should be the only mode of instructional delivery within a classroom setting, and (2) how student achievement gains can be measured when the computer is used for complete instructional delivery. They review research relating to the effectiveness of CAI and examine diverse factors that can be used to measure student achievement in a computer-based instructional environment.

Berger, Carl F., and Zinn, Karl L. "What? Me Do Research?: Of Course, Say Two Top Researchers and They Tell You How." *Classroom Computer News* 2, no. 2 (November-December 1981): 16-17.

The authors demonstrate how teachers of any curriculum and any age group can conduct their own research study or studies to provide documentation about the impact of microcomputer-based instruction on their students. The authors suggest a list of potential

questions that teachers and administrators can ask to determine the purpose, scope and design of their research needs.

Boas, Edward. "An Analysis of Instructional Delivery Systems in Vocational Education Computer-Managed Instruction, Teacher-Delivered Module (Paper) and Lecture-Demonstration for the Same Instructional Module." In *Mission of the Future: Proceedings of the Annual Convention of the Association for the Development of Computer-Based Instructional Systems*. San Diego, CA: Association for the Development of Computer-Based Instructional Systems, 1979: 409-412

The author reports the results of a study he conducted on 202 drafting students at Delcastle Technical High School in Delaware comparing CMI to instruction delivered by (1) a teacher-lecture method, and (2) by individualized paper modules. Results showed that student achievement was highest with CMI. Although not conducted on a microcomputer, the author's work raises research and implementation issues for the future of CMI in vocational education.

Burns, Patricia Knight, and Bozeman, William C. "Computer-Assisted Instruction and Mathematics Achievement: Is There a Relationship?" *Educational Technology* XXI, no. 21 (October 1982): 32-39.

The authors attempt to synthesize research that is available about the use and effectiveness of CAI for the teaching of mathematics. They say that with the growing availability of personal computers, even the smallest schools will have access to computer-based instruction and will need information about its effectiveness. The authors identify evidence of CAI effectiveness from their synthesis as well as issues that need additional study.

Callison, William. "The Potential is Great: Problems and Possibilities for Computer-Assisted Instruction." *NASSP Bulletin* 5 (1981): 24-28.

The author indicates that computer-assisted instruction will not totally meet students' instructional needs. He calls for a CMI component to complement the CAI instructional component. He describes four computer systems and the potential for integrating CAI and CMI on each. Two of the systems are microcomputers.

Craft, C. O. "Research on the Use of Computer-Assisted Instruction." *Man, Society Technology* 41, no. 7 (April 1982): 26-27.

The author writes that the hardware that will allow CAI to reach its full potential is presently available. However, he says the potential, especially in the field of industrial arts education, will not be reached for another decade because of software inadequacies. He cites research indicating that the computer can be profitably used for industrial arts instruction and calls for a remediation of the software problem.

Denis, Richard J. *Computer-Managed Instruction and Individualization*. The Illinois Series on Educational Application of Computers No. 11E. Urbana, Illinois University, Department of Secondary Education, 1979.

The author writes that although computer-managed instruction was not one of the earliest computer applications to be developed, it is among the more rapidly growing applications. He explores the many ways in which CMI functions can be of value to the classroom instructor and issues that need to be considered when implementing CMI in the classroom.

Fiske, Edward B. "Computers Alter Life of Pupils and Teachers." *New York Times*, 4 April 1982 pp. 1, 20.

The author examines changes that are occurring in classrooms as a result of increased computer use. Then, he explores the debate between those who claim that computers enhance the instructional process and those who see computers as a negative force.

Forman, Denyse. "Search of the Literature." *The Computing Teacher* 9, no. 5 (January 1982): 37-51. (Excerpt from Instructional Use of Microcomputers: A Report on British Columbia's Pilot Project, prepared for the British Columbia Ministry of Education.)

The author presents a comprehensive review of computer-assisted instruction (CAI) literature for educators who do not have time to conduct such a search. In her view, the review she has completed is a valid starting place for educators wanting to make decisions about instructional computer applications for education.

Frenzel, Lou. "The Personal Computer—Last Chance for CAI?" *BYTE* 5, no. 7 (July 1980): 86, 88, 90, 92, 94, 96.

The author explores the debate over the pros and cons of computer-assisted instruction. He claims that although CAI is widely known, it has not been used extensively. Now, with the personal computers, more teachers have access to CAI. His conclusion is that CAI is not a panacea for educational problems, but it does have some very positive qualities for classroom instruction.

Johnson, Craig W. "Microcomputer-Administered Research: What it Means for Educational Researchers." *Educational Researcher* 11, no. 3 (March 1982): 12-16.

The author explores the utility of microcomputers for educational research. He lists and identifies several advantages and disadvantages.

Hannum, David. "A Guide to Computer-Based Training Systems." *Interface Age* 6, no. 10 (October 1981): 73-74, 160.

The author writes that education, in general, is rapidly moving into the realm of computer-based training (CBT). He says that this type of training can be valuable to industry, too. He identifies advantages that CBT brings to a firm, issues to consider when designing a training delivery system, and hardware systems that are available for instructional delivery.

Herriott, John. "CAI: A Philosophy of Education—and a System to Match." *Creative Computing* 8, no. 4 (April 1982): 80, 82, 84, 86.

The author writes that schools and educators have not fully and effectively utilized the computer as a teaching aid. He examines the multiple uses a computer can have in an educational setting, the ways in which schools themselves can change through computer use, and the roles that both computers and teachers will be able to have in a computer-based instructional environment.

Lee, Chris. "Adding the New Technology to Your Training Repertoire." *Training/HRD* 19, no. 4 (April 1982): 18-21, 24-26.

The author writes that the need for skill training and retraining within industry and business companies can be addressed more easily when a microcomputer is used. She cites examples of companies that are already using CAI with their employees, and examines issues of course design and software development.

Loop, Liza, and Christensen, Paul. "Exploring the Microcomputer Learning Environment." *Independent Research and Development Project Reports*. Report #5. San Francisco, CA: Far West Laboratory for Educational Research and Development, November 1980.

The authors conducted a study of the "environment" of educational microcomputer use in the San Francisco Bay Area. To implement their study, they interviewed local teachers and prepared a review of relevant literature. They summarized the state-of-the-art of educational microcomputer use, developed a scheme for classifying computer-assisted learning environments and identified positive and negative factors influencing microcomputer use.

Molettiere, Lou; Konsyznski, Ben; and Stott, Jack. "Development of a Distributive Education System." In *A Gateway to the Use of Computers in Education: Proceedings of the Annual Convention of the Association for Educational Data Systems*. St. Louis, MO: Association for Educational Data Systems, 1980: 149-151.

The authors review both immediate and longer-range trends in instructional technology that will employ both microprocessors and videodiscs. They discuss ways in which this technology can make industrial training in the 1980s more effective.

Molner, Andrew R. *Computer Innovations in Education: The Use of Computers in Mathematics Education Resource Series*. Columbus, OH: ERIC Information Center for Science, Mathematics, and Environmental Education, Ohio State University, February 1973.

Although the paper was written in 1973, the author presents a summary of educational computer applications up to that time. As such, the work stands as a description of a starting point for a change (i.e., computer-based instruction) that is still developing. He examines the computer's role in society, available types of instructional systems, instructional applications, administrative applications, course design, and cost-effectiveness.

Pflaumer, Elizabeth M. "Getting Started in CTB." *NSPI Journal* XVIII, no. 9 (November 1979): 3-6, 25.

The author says that with computer costs declining, computer-based training is beginning to look more attractive. Her article is based on answers to questions which, when answered, may help readers to decide whether or not to progress with computer-based training for their instructional settings.

Spencer, Mima, and Baskin, Linda. "Classroom Computers: Do They Make a Difference?" *Classroom Computer News* 2, no. 3 (November-December 1981): 12-15.

The authors write that most of the research that has been done on computer-assisted instruction has focused on large mainframe, timesharing computers. They indicate that results from these studies (which generally evidence a positive impact) cannot be applied to CAI delivered on microcomputers. They cite a need for such research and identify issues that need to be examined.

Squire, Lisa; Owens, Ernest; and Van Metre, Nick. *Effects of 18/1 and 30/1 Student-Instructor Ratios on Student Achievement and Instructor Activities in a Computer-Managed Course*. Paper presented at Western Psychological Association Convention, 1978.

The authors conducted a study to assess the effects of varied student-to-instructor ratios (18-to-1 and 30-to-1), on student achievement and instructor behavior in a computer-managed course. The purpose of the research was to determine whether higher ratios could be used without adversely affecting instructional quality. The study was conducted with a naval CMI course in basic electricity and electronics.

Steffin, Sherwin. "What Does the Computer Teach Best?" *Softline* 1, no. 4 (March 1982): 23, 25.

The author reviews briefly several ways in which computers can assist with the educational process. He says that computers are more effective for some curricula areas and tasks than others. Throughout his article, he offers suggestions that will help educators define the most effective uses for computers in their classrooms.

Steinberg, Ester R. "Learner Interaction in Computer-Assisted Instruction." In *Proceedings of the Annual Convention of the Association for the Development of Computer-Based Instructional Systems*. Vol. I, pp. 194-202. San Diego, CA: Association for the Development of Computer-Based Instructional Systems, 1979.

The author says that for the development of good guidelines for computer-assisted learning, research should first be conducted on individual learners, their interaction patterns with the computer, and personal learning styles. She presents a rationale for this type of research and indicates how it will lead to a more effective classroom use of CAI.

VanMater, Nicholas H. *Problems in Researching Computer-Managed Instruction*. Toronto, Canada: American Educational Research Association, March 1978.

The author identifies several obstacles that can hinder attempts to formally study large-scale computer-managed instruction efforts. He bases his work on the Navy's CMI program that manages over 7,000 students daily in nine courses located in four geographic regions.

Institutional Management

Cullen, Kathryn. "Systems for Authorized Access to Information." *Administrative Management*, XLIII, no. 5 (May 1982): 35-38.

The author writes that along with a trend toward the use of microprocessors for management and administrative tasks has developed a tendency to allow computer users to access terminals easily. She says that this latter trend has opened the way for more abuse of confidential data, more possibility of data errors and omissions, data theft, and transaction-entry errors. She discusses and reviews various types of administrative, physical, system, and application controls that are available to stem abuses.

Ellis, Joe. "Friend or Foe? Making the In-House Computer Work for Your School." *NASSP Bulletin* 5, no. 445 (May 1981): 16-18, 21-22.

The author writes that with the growing use of microcomputers, there is increased interest in using them for school, office, and management functions. He says that the conversion, to

an in-house computer system does not have to be a nightmare if there is an awareness of potential obstacles and how to overcome them. The author focuses on issues that administrators should consider before a microcomputer is purchased for the school office.

Francis, Larry. "Five Phases in the Life of CBE Sites: Consideration of Alternatives. II. Staff Selection and Retention." In *Proceedings of the Annual Convention of the Association for the Development of Computer-Based Instructional Systems*. Vol. I, pp. 33-39. San Diego, CA: Association for the Development of Computer-Based Instructional Systems, 27 February - 1 March 1979.

The author has written a paper that is of interest primarily to those schools and districts that have their own computer media or education center. He examines the staffing pattern necessary to manage such a center and identifies specific skills that staff should have. Since he assumes that the staff of such a center will be developing software, he examines the roles they will play and the skills they will use in this task.

Hanson, Thomas; Klassen, Daniel; and Lindsay, James. *A Study of the Availability, Use and Impact of Computers in the Administration of Schools and School Districts*, Washington, DC: U.S. Department of Health, Education and Welfare, National Institute of Education, November 1977.

The authors conducted a study of schools and school districts in Minnesota that use computers for administrative purposes. The study, at the time it was conducted, focused on larger, timesharing computers. However, the findings regarding specific benefits accruing from administrative computer use (e.g., more accurate personnel and financial records, more accurate enrollment projections, and computerized bus scheduling) and limits of computer use for planning and decision-making tasks are informative for users of any computer system.

Haugo, John E. "Management Applications of the Microcomputer: Promises and Pitfalls." *Journal of the Association for Educational Data Systems* 15, no. 4 (Summer 1981): 183-188.

The author writes that with the use of microcomputers, in schools has come an interest in microcomputers to handle administrative activities, especially in small districts and in individual schools in large districts. He says that since businesses already use microcomputers for management and administrative tasks, special software already exists for similar applications in the schools. He recommends that school administrators engage in a three-step planning process before they make final decisions regarding the use of a microcomputer. He offers a listing of potential applications and potential pitfalls.

Huntington, John F. "The Impact of Changing Computer Resources on Educational Institutions and Computer-Based Education Training Programs." *Educational Technology* 21, no. 10 (October 1981): 55-59.

The author says that educators are unprepared to effectively integrate microcomputer-based education into the school curricula. He calls for more documentation of educational computer applications and examines the type of staff training needed for those who are using the new microcomputer-based technology.

Moursand, David. *School Administrator's Introduction to Instructional Use of Computers*. Eugene, Oregon: International Council for Computers in Education, University of Oregon, 1980.

The booklet is a guidebook that examines questions that administrators may ask regarding the application of computers in education and the instructional process. Among the topics included are: interactive computing, computer hardware and software, problems that computers can help to solve, programming languages, categories of educational computers, and the impact computers should have on the curriculum.

Roecks, Alan L. "How Many Ways Can the Computer be Used in Education?" *Educational Technology* 21, no. 9 (September 1981): 16.

The author conducted a survey of computer use in fifty schools served by his agency. A listing of thirteen uses emerged once the data were compiled and analyzed. Twelve of these paralleled those suggested by another educator (Norman Watts—see a later citation).

Savage, Earl R. "Education 80: The Paper Monster Is Your Ace in the Hole." *80 Microcomputing* no. 29 (May 1982): 388-389.

The author says that one important use of microcomputers for education (i.e., in administration and management), has received little attention. He writes that microcomputers can help attack a school's paperwork problem and provide more information for decisionmaking. He lists a variety of applications under three distinct headings: selected administrative, quasi-administrative, and selected teacher/teacher-clerical applications. All of these relate in one way or another to the broader category of institutional management.

Skinkle, John D., and Foecke, Jerome F. "Information Systems for Vocational Education Programs: Needs of the Local Agency." *Journal of the Association for Educational Data Systems* 14, no. 1 (Fall 1980): 1-15.

The authors explore the need for vocational institutions to develop management information systems. They say that there is no one, comprehensive listing of database needs. However, they suggest a variety of ways in which schools can analyze their own data needs to develop a database. They consider database design goals, a structure for classifying data needs, and actual information needs of the local agency.

Stevens, Dorothy Jo. "Computers, Curriculum and Careful Planning." *Educational Technology* 21, no. 11 (November 1981): 21-24.

The author examines concerns such as (1) how to train staff to use microcomputers as instructional tools, (2) how computers can best be used in the instructional process, and (3) the impact computer-based instruction will have on student achievement and learning. She examines issues and concerns that need to be addressed as administrators design and implement programs in (1) computer science, (2) computer literacy, (3) CAI, and (4) CMI.

Watts, Norman. "A Dozen Uses for the Computer in Education." *Educational Technology* 21, no. 4 (April 1981): 18-22.

The author says that the potential uses of computers in education has been well documented. However, not until the introduction of the microcomputer was the computer seen as a serious influence. The author identifies and defines twelve fundamental ways in which computers can be used (many of which relate to institutional management tasks). Specific applications for microcomputers are not singled out, but if a particular application is inappropriate for a microcomputer, the author comments.

Software

General Issues

Alexander, Wilma Jean. "The Problem of Software." *VocEd* 57, no. 3 (April, 1982): 39.

The author identifies the qualities of commerical software that educators should consider before making purchases. She also describes two state-sponsored projects that were designed to assist educators with software development and dissemination.

"Computer-Using Educators (CUE) Position Paper on Commercial Software Pricing Policies." *The Computing Teacher* 8, no. 6 (1980-1981): 53-54.

The Computer-Using Educators group explores the issue of fair software pricing policies for educators. In this paper, the group offers recommendations for a policy they consider to be favorable to educators.

Dean, Jay W. "What's Holding Up the Show?: It's Not the Micros, but Materials to Use with Them." *Today's Education* 71, no. 2 (April-May 1982): 21-23.

The author draws attention to the need for better microcomputer software for educators, and says that a lack of good software restrains the use of microcomputers in education. He offers constructive criticism of the software industry and suggests specific improvements that are needed.

Dwyer, Tom. "Books as an Antidote to the CAI Blues, or Take a Publisher to Lunch." *BYTE* 5, no. 7 (July 1980): 74, 76, 78, 80, 82, 84.

The author states that educational software needs to be more imaginative. He also says that more public support and instructor participation is needed in the courseware development process.

Fisher, Glenn. "Computer Games in the Classroom." *Recreational Computing* 9, no. 4 (January-February 1981): 52-53.

The author writes about the use and value of games and simulations for classroom instructional use.

Green, Wayne. "Publisher's Remarks: Schools Self-Destruction." *Microcomputing* VI, no. 3 (March 1982): 6,8.

The author explores, with some depth, the issue of inadequate educational software. He looks at the problem from the side of the software publisher, saying that until producing educational software becomes more cost effective for the publishers, the current situation is likely to continue.

Hechinger, Fred M. "Computer Software Found Weak." *New York Times*, 20 April 1982 p. 23.

The author examines the inadequacies of educational software. He cites and summarizes several studies conducted by leading microcomputing educators that find commercial software to be pedagogically flawed and boring. He writes that this situation restrains the spread of microcomputers in education.

Koetke, Walter. "Ongoing Search for Software: Market's Potential Untapped." *Microcomputing* 6, no. 3 (March 1982): 172, 174-175.

> The author writes that although some excellent software packages have been produced for the microcomputer, the overall supply of good educational software is inadequate. He explores the reasons for this situation (e.g., many smaller companies have left the market, large companies often just serve as "middlemen," software piracy is common among educators, and the micro-software industry is still in its infancy).

Lathrop, Ann. "Building the Software Collection: Part III." *Educational Computer Magazine* 2, no. 1 (January-February 1982): 16-17, 52-53.

> The author writes that critical evaluation of software programs and packages is essential for building a quality collection of educational software. She demonstrates, in the article, how to conduct a software package evaluation. She offers questions that the evaluator should consider and includes sample worksheets and checklists for convenient reference.

Lathrop, Ann. "Software Distributors Offer 30-Day Return Policy." *Educational Computer Magazine* 2, no. 2 (March-April 1982): 20.

> The author indicates helpful resources that will help the reader locate instructional software and other computer-related courseware. For the software resources, the author listed publishers that offer a thirty-day trial return policy.

Marsh, Paul W. "Response to Computer-Using Educators (CUE) Position Paper on Commercial Software Pricing Policies." *The Computing Teacher* 9, no. 1 (September 1981): 45-46.

> The author discusses the plight of educational software. He places some responsibility for the current educational software situation directly on educators because of the way they violate copyright laws and establish payment policies for their purchases. Solutions are possible, says the author, but they tend to be of a long-term nature.

Meyers, Alan M. "The Perils of Pioneering in the Software Industry." *On Computing* 2, no. 2 (Fall 1980): 40-43.

> The author reviews and explains the difficulties that frequently plague software producers and publishers. He also explores the state of tension that often exists between producers and users and offers guidelines for those software producers who want to build a successful clientele.

Michael, Frederick, W. "Educational Computing at the Crossroads." *Interface Age* 6, no. 10 (October 1981): 69-70, 158.

> The author takes the position that most classroom computers today are not fully utilized because of an inadequate courseware supply. He suggests that one of the solutions to this problem is for teachers to write their own courseware. He explores recent developments in this area and offers suggestions for improvements that must yet be made.

Noonan, Larry. "Computer Simulations in the Classroom." *Creative Computing* 7, no. 10 (October 1981): 132, 134, 136, 138.

In this article, the author asks and then proceeds to answer the question: "Why use a computer simulation in the classroom?" To answer this question, he draws on his own experiences in using simulations in his classes and describes positive benefits that accrue to students from using simulations. He offers practical suggestions for teachers wanting to use simulations and lists companies that produce simulations for microcomputer and educational use.

Otte, Richard B. "Courseware for the 80s." In *Proceedings of the Fourth International Learning Technology Conference*. Orlando, FL: Society for Applied Learning Technology, February 1982.

The author's objective is to help educators select from the vast array of software that is available and develop courseware that is of the highest possible quality. His paper addresses two questions: "How can quality courseware be determined?" and "How can the instructor choose from the courseware that is available?"

"Software in the 80s." *On Computing, Inc.* 2, no. 2 (Fall 1980): 36-39.

This article is based on an interview with two software manufacturers. Both offer their perceptions about software development in the 80s. They cite, among other factors, an increasing emphasis on quality software, more standardization, more flexibility and more integration among software packages.

Steffin, Sherwin A. "The Educator and the Software Publisher: A Critical Relationship." *Technological Horizons in Education Journal* 9, no. 3 (March 1982): 63-64.

The author examines the critical relationship that exists between educators and software publishers. He explores the position of each side regarding software production and use, and calls for a greater amount of mutual understanding, cooperation, and feedback.

Steffin, Sherwin. "Games, Education, and Myth." *Softline* 1, no. 3 (January 1982): 24-25.

The author writes that computer games claiming to have educational value often distract the learner and provide mere entertainment instead of enhancing the learning process. He offers a series of questions that can help the educator better determine the motivational and educational merits of software.

Design and Development Issues

Corgan, Virginia E. and Spitler, C. Douglas. "Rules for Authoring Computer-Assisted Instruction Programs." *Educational Technology* XIX, no. 11 (November 1979): 13-20.

The authors present guidelines and considerations that educators can use when they select, develop, and utilize software. They suggest that educators need to use more discrimination in deciding whether a computer should be used for instructional delivery, and, once chosen, how it should be used.

Curtin, Constance. "Advice to the Author." *The Computing Teacher* 8, no. 6 (1980-1981): 42.

The author presents a series of ten guidelines that authors should follow when writing educational materials for the microcomputer.

Gagne, Robert M.; Wager, Walter; and Rojas, Alicia. "Planning and Authoring Computer-Assisted Instruction Lessons." *Educational Technology* XXI, no. 9 (September 1981): 17-26.

The authors offer guidelines and suggestions for those who must plan and author computer-assisted instructional programs. They call for programs that differ from the traditional programmed instruction approach. Their approach is one that they consider to be appropriate for the current generation of microcomputers.

Kehrberg, Kent J. "Microcomputer Software Development: New Strategies for a New Technology." In *A Gateway to the Use of Computers in Education: Proceedings of the Annual Convention of the Association for Educational Data Systems*, pp. 343-346. St. Louis, MO: Association for Educational Data Systems, 1980.

The author distinguishes between educational courseware development for traditional mainframe computers and the newer microcomputers. He offers courseware authoring suggestions and guidelines specifically developed for the microcomputer. His opinions and positions are based upon personal experiences with the Apple II and Radio Shack TRS-80 in both elementary and secondary schools.

Kingman, James C. "Designing Good Educational Software." *Creative Computing* 7, no. 6 (October 1981): 72, 74, 76, 78, 80-81.

The author has formed his own firm for developing educational microcomputer software. He has developed and identified eight guidelines which, he says, will not guarantee a good program, but will ensure against a bad one. For each guideline, he supplies helpful suggestions and illustrations.

Kosel, Marge. "Designing Educational Software: A Model in Use." In *A Gateway to the Use of Computers in Education. Proceedings of the Annual Convention of the Association for Educational Data Systems*, pp. 104-107 St. Louis, MO: Association for Educational Data Systems, 1980.

The author writes about a model for microcomputer software development that is utilized by the Minnesota Educational Computing Consortium. She stresses the fact that software creation for microcomputers is a completely different process from the procedure used for older, larger computers. She says that microcomputers offer expanded resources and capabilities for the software designer.

Pogue, Richard E. "The Authoring System: Interface Between Author and Computer." *Journal of Research and Development in Education* 14, no. 1 (Fall 1980): 57-67.

The author presents philosophy of an approach for designing and implementing a CAI authoring system. He identifies seven characteristics that such a system needs and provides an underlying rationale for each one.

Roblyer, M. D. "Courseware: Instructional Design of Courseware: Good News and Bad News." *Educational Technology* XXII, no. 2 (March 1982): 36-37.

The author stresses the necessity of up-front planning when designing instructional computer courseware. She suggests that developers use a four-step plan. She defines and explains the four steps in her article.

Roblyer, M. D. "When is it 'Good Courseware?' Problems in Developing Standards for Microcomputer Courseware." *Educational Technology* XXI, no. 10 (October 1981): 47-54.

The author reviews some basic problems with some of the current criteria used for evaluating computer courseware. She proposes a strategy for deriving a more useful set of standards, one that is more appropriate for microcomputers.

Rowe, Neil C. "Some Rules for Good Simulations." *Educational Computer Magazine* 1, no. 4 (November/December 1981): 37-40.

The author writes that he reviewed several computer simulations for biology from a variety of companies and found most of them to be unsatisfactory for his needs. As a result, he decided to prepare a set of guidelines for those who evaluate and author simulations. The definition and illustration of the guidelines comprise the article.

Schneiderhan, Dale, and Griffing, Shirley. "One State's Approach: Instructional Software Development." *The School Administrator* 39, no. 4 (April 1982): 14-15.

The article is a detailed review of the Minnesota Educational Computing Consortium's approach to software development and dissemination. The agency coordinates and manages the state's computing efforts. This effort is explained in the article.

Wager, Walter. "Design Considerations for Instructional Computing Programs." *Journal of Educational Technology Systems* 10, no. 3 (1981-1982): 261-269.

The author has examined a number of software authoring systems for computer assisted instruction. He says that while these packages present the designer with rules about the mechanics of CAI, they do not enable the developer to meet student needs effectively. The author seeks to counter this situation by presenting a model for CAI software design based on Robert M. Gagne's information processing model.

Selection and Evaluation

Cohen, Vicki L. Blum. *Evaluating Instructional Software for the Microcomputer*. NY: American Educational Research Association, 1982.

The author writes that although there has been a phenomenal increase in the sale of microcomputers over the last three years, the art of software technology has not kept pace. Also, she says that no systematic procedure exists for the evaluation and revision of educational software programs used on the microcomputer. Her study details a project she conducted to develop such a procedure. Sample work sheets and rating forms that educators can use are included.

Douglas, Shirley and Neights, Gary. *Instructional Software Selection: A Guide to Instructional Microcomputer Software. Microcomputers in Education Series*. Harrisburg, PA: Pennsylvania State Department of Education, n.d.

The authors have written a handbook for instructors on software selection and evaluation criteria. Questions and considerations important to the selection and evaluation process are included. Sample rating forms and criteria checklists are also presented.

Evaluation Guide for Microcomputer-Based Instructional Packages. Eugene, OR: International Council for Computers in Education, 1982.

This is a microcomputer instructional software evaluation guide. It is a tool useful for conducting and writing carefully documented, thorough software reviews. It was designed to be especially useful for preservice and inservice instructors, practitioners, software developers, and any others who use software reviews. Actual forms and worksheets, along with explanations of review criteria, are included.

Judd, Dorothy H. and Judd, Robert C. "Evaluations of Instructional Programs for Microcomputers." *Educational Computer Magazine* 2, no. 2 (March-April 1982): 16-17.

The authors offer information about a variety of resources that are available to help educators conduct evaluations of microcomputer instructional software. Organizations (e.g., educational laboratories),are named and specific journals and periodicals carrying software reviews are mentioned. Authors say, however, that responsibility for software selection and evaluation rests with the individual school or local community.

Kleiman, Glenn; Humphrey, Mary M.; and Van Buskirk, Trudy. "Evaluating Educational Software." *Creative Computing* 7, no. 10 (October 1981): 84-86, 88, 90.

The article is a basic primer on software evaluation. The authors suggest questions that software developers and users should ask themselves. They write that if these questions are properly answered, educators will be able to develop and select courseware that is more closely tailored to their needs.

Maples, Dundee. "The Educational Program Evaluation Centre: An Interview with Carolyn M. Stauffer. *Educational Computer Magazine* 2, no. 2 (March-April 1982): 28-29.

The article is an interview with Carolyn Stauffer, manager of the Apple Education Foundation's Educational Program Evaluation Centre. During the interview, Stauffer discusses her approach to microcomputer educational software evaluation and the Centre's creation of the *Journal of Courseware Review*, a publication dedicated to the review of educational software.

"Preliminary Steps in Choosing a Software Package." *Online* 6, no. 2 (March 1982): 65-67.

The article is an overview of steps to take in choosing and implementing instructional software packages. Special emphasis is placed on steps that can be taken to ensure complete operability of the newly purchased program.

Watt, Molly. "Making a Case for Software Evaluation." *The Computing Teacher* 9, no. 9 (May 1982): 20-22.

The author writes that more evaluation of instructional microcomputer software is needed. She says, however, that educators (because of their training and background) bring the needed evaluation skills to their job. She provides general pointers about criteria that should comprise a software review and mentions the utility of rating forms and checklists prepared by various groups. However, she says that these forms are only guides, and that each instructor must put together an evaluation that suits the particular need and situation.

General-Use Surveys

Bitter, Gary G. "Survey of Arizona Public School Practices and Needs for Computer-Assisted Instruction." *The Computing Teacher* 8, no. 6 (1980-1981): 31-34.

The article is a summary of a state-wide survey of microcomputer use in Arizona school districts. Conducted by faculty at the University of Arizona's College of Education, the purpose of the survey was to determine: types of microcomputers in use; types of applications; potential cooperation between schools and the University for microcomputer projects; special CAI projects; and special problems associated with microcomputer use.

Chambers, Jack A, and Bork, Alfred. *Computer-Assisted Learning in U.S. Secondary/Elementary Schools*. New York Association for Computing Machinery, July 1980.

The paper is a report of a study the authors conducted to assess current and projected use of computers in U.S. public secondary and elementary schools. The emphasis of the study was to determine CAI applications. Throughout the country, 974 districts were sampled. The study covered mainframe, mini, and microcomputers.

Dolen, Daniel J. "Montana Office of Public Instruction Surveys Computer Education Activity in Schools." *The Computing Teacher* 9, no. 9 (May 1982): 58.

The author reports on a survey of computer use in Montana's secondary and elementary public schools. The survey covered applications, schools' needs for assistance, and specific hardware used in the schools. The survey indicated that there were 482 microcomputers in the schools, that software development was the most pressing need, and that the TRS-80 Radio Shack was the most popular microcomputer.

Edwards, Judith B. *Educational Computing in the Northwest, 1979: Status and Needs for Information and Assistance*. Portland, OR: Northwest Regional Educational Laboratory, June 1979.

The author reports a study that was conducted as part of a planning effort at the Northwest Regional Educational Laboratory. The study was based on two surveys. One was conducted to determine the current status of and future plans for computer use in school administration and instruction in a six-state area served by the agency. The second was an in-depth survey of educators' information and assistance needs in these same states.

Hargan, Carol and Hunter, Beverly. *Instructional Computing . . . Ten Case Studies*. Alexandria, VA: Human Resources Research Organization, 1978.

The book contains a description of instructional computing programs at ten precollege institutions. It was designed and written for administrators, staff, and students who want to plan, expand, or improve the instructional use of computers at their schools. An extensive descriptive profile is included for each of the sites.

Identifying and Getting Your Share of the School Market for Microcomputers. Westport, CT: Market Data Retreival, October 1981.

This is a report of a survey of 15,442 school districts conducted in the summer of 1981. The survey was designed to (1) collect demographic and school facility information for each district and to determine which districts use microcomputers for instruction, (2) to determine who recommends and purchases the equipment, and (3) to identify which schools have access to survey data and national projections of instructional microcomputing use.

Microcomputers in Education: Applications of Microprocessors in the Schools - A Report to the Northeast Regional Education Planning Project. Cambridge, MA: Technical Education Research Centers, Inc., 1980.

The report is a study of the educational uses of microcomputers in six northeastern states. Along with the information about specific applications, the report contains information such as (1) a resource listing of instructional courseware by computer type and (2) national and state-level policies or program procedures being used to guide and assist with the purchase of microcomputer hardware.

Roblyer, M. D. "More Hands for Teachers: Report of an Instructional Computing Study for the State of Florida." In *A Gateway to the Use of Computers in Education: Proceedings of the Annual Convention of the Assocation for Educational Data Systems*, pp. 165-171. St. Louis, MO: Association for Educational Data Systems, 1980.

The author reports on the results of a state-wide planning study of computer applications conducted in Florida. The survey and the resulting report were undertaken for the development of a state-wide policy for the instructional use of computers. The survey was designed to examine the role, feasibility, and cost-effectiveness of instructional computing in the state.

Stutzman, Carl R. *Computer-Supported Instruction in California Elementary and Secondary Schools: A Status Report.* Fresno, CA: California State University, March 1981.

The author reports the results of a survey conducted in California to collect information about the use of computers in the state's public elementary and secondary schools. The survey was done for the purpose of designing inservice training for instructional computer applications for school administrators and teachers.

Instructional (Vocational Applications)

Beamer, Rufus W. "Advisory Councils - A Mechanism for Coping." *The Agricultural Education Magazine* 53, no. 1 (July 1980): 7-8.

The author cites technological changes (e.g., computers and automation) that are appearing in the agricultural field. He says that high schools, vocational-technical centers, and two- and four-year colleges all need to train students to use the new technology. He recommends that these institutions work closely with employers and industry advisory councils to ensure that their agricultural curricula reflect the most recent technological advances.

Brook, Dan R. "Microcomputer Applications for Industrial Arts." *The Journal of Epsilon Pi Ta* V, no. 2. (Fall 1979): 68-70.

The author presents a discussion of specific ways in which a microcomputer can be useful for the industrial arts classroom. He examines the use of the computer as a tool to deliver instruction and as a management aid for the instructor. He also explains (1) the distinction between a micro and a minicomputer, and (2) applications of microcomputers in the general educational environment.

Catalog of Innovations Development: Innovative Programs in Vocational Education, 1981. Final report. Tallahassee, FL: Florida State Department of Education, Division of Vocational Education, June 1981.

This is a small directory of innovative educational programs in the state of Florida. Of the twenty-one projects included, one involves a microcomputer application. The project is an electronics technology course at Santa Fe Community College. Each student must complete three credits of BASIC programming with a microcomputer and three in the application of microcomputers to electronics. An informational profile of the project is included.

Clogston, Tom. "Case Study Application: CBI for a High-Tech Industry." *Instructional Innovator* 25, no. 6 (September 1980): 22-24.

The author relates his experience in using microcomputers and minicomputers for in-house training at the Boeing Aerospace Company in Seattle, Washington. He says that industrial training at the company has been developed to help employees keep abreast of current computer technology. Software programs were also developed to assist with the management of training functions.

Dean, Jay W. "Computers in Agricultural Education: Minnesota's Response to the Computer Revolution in Education." In *Proceedings of the Fourth International Learning Technology Conference*, pp. 78-82. Orlando, FL: Society for Applied Learning Technology, February 1982.

The author says that although there is an increasingly good supply of on-farm computer software available, there is a lack of classroom software. He writes about the state of Minnesota's efforts to integrate computers into the vocational classroom and develop software for classroom use. The Minnesota Educational Computing Consortium placed Apple II microcomputers in varied secondary classrooms around the state and an agricultural economist at the University of Minnesota either modified existing software, or developed new software for the Apple II.

Dickey-Olsen, Patsy A. "Keyboarding." *The Balance Sheet* 63, no. 2 (November 1981): 91-93.

Although not written expressly for secondary-level instructors, the article discusses the need to provide students entering the business world with keyboarding skills. The author discusses the need for students to be familiar with keyboards for microcomputers, ten-key calculators, and word processors. She reviews development and implementation issues associated with a keyboarding course.

Drum, William O. "Microcomputers in Business Education." *The Balance Sheet* 63, no. 3 (December 1981 - January 1982): 143-145.

The author says that the business curriculum in the past often ignored computers and data processing. However, he writes that with the microcomputer's low expense such computer training is easily accessible. He suggests varied in-service training resources that will acquaint teachers with microcomputers and identifies automated computer applications that business and accounting students should understand.

Eigmy, Myron A. and Fuller, Boyd. "Report on a Postsecondary Program: Using Computers in Farm Management Education." *The Agriculture Education Magazine* 53, no. 4 (October 1980): 18-19.

Although the authors write about the use of a microcomputer for a postsecondary agricultural education course (at the University of Minnesota Technical College), their article provides a rationale for the use of microcomputers in any agricultural education classroom. They also describe specific tasks that are appropriate for computer application.

Ellis, John A. "A Comparative Evaluation of Computer-Managed and Instructor Managed Instruction." Paper presented at the Annual Meeting of Association for the Development of Computer-Based Instructional Systems, Dallas, TX: Association for the Development of Computer-Based Instructional Systems, March 1978.

The author presents results of a study conducted at the Navy's Propulsion Engineering School at Great Lakes, Illinois, comparing computer-managed to instructor-managed instruction. The study does not focus specifically on microcomputers. However, issues are included regarding (1) advantages accruing to teachers using CMI and (2) implications for inservice training for instructors using CMI.

Forrest, Joyce. "Business Educators: Know Your Micros." *Journal of Business Education* 55, no. 5 (February 1980): 206-207.

The author presents an overview of microcomputers for the business educator. She identifies the components of a microcomputer system and discusses the type of system best suited for business education applications. She also suggests ways the microcomputer can be used for both business-related classes and the school administration.

Halvorsen, Nancy. "Training to Use Microcomputers for Accounting Procedures." *Journal of Business Education* 57, no. 7 (April 1982): 270-271.

The author writes about her experiences in utilizing microcomputers for accounting classes at the Billings (Montana) Postsecondary Vocational Technical Center. She offers a rationale for microcomputer instruction, suggests specific skills that might be emphasized in a course, outlines equipment needs, reviews the instructor's role, and identifies general instructional competencies that should be included in course offerings.

Harris, Edward E. "The Face of the Future: Marketing." *VocEd.* 57, no. 1 (January-February 1982): 37, 82.

The author discusses new computer and electronic equipment that is becoming available and describes how these developments will affect careers in the field of marketing. He says that those who are trained currently will have obsolete skills by the 1990s unless some new curriculum development and/or retraining occurs. He also stresses the need for educators to maintain close contact with the business community so that up-to-date training is ensured.

Hines, Fred. "Introduce the Pixel with a 4K Graphics Board: Minicourse on Microprocessors Part 8." *School Shop* 41, no. 10 (May 1982): 27-29.

This article is one of five in a series centered on the theme of "Minicourse on Microprocessor." In this particular article, the author provides an explanation of how to

introduce students to one of the basic forms of graphics (the pixel), using a 4K graphics board.

Hudson, Jordan C. *Computer-Assisted Instruction in Agricultural Education*. Anaheim, CA: American Vocational Association, December 1979.

The author presents a discussion of benefits that accrue from using a computer to deliver instruction in agricultural education. He also provides a brief example of a software program that has been written for use in agricultural education.

"The Innovative Resource Center in Computer Applications." Rock Hill, SC: York Technical College, n.d. (Descriptive Brochure.)

This is a descriptive pamphlet of the Computer Applications Resource Center at York Technical College in Rock Hill, South Carolina. The Center is one of five innovative programs that were established in the state. The pamphlet describes the Center's responsibilities (e.g., instructor training for other technical colleges in the state, leadership in developing CAI applications, and consultations for the business community) and lists the variety of hardware systems in use at the Center.

Jelden, David L. *The Microcomputer I as an Interactive Instruction System in the Classroom*. Greely, CO: University of Northern Colorado, 1980.

Although this is a report of a study that was conducted in a higher education environment, the project's design and results are relevant to the development and implementation of microcomputer instruction for technical vocational education courses. The study tested the feasibility of using a microcomputer system as an interactive tutorial instructional tool for industrial arts and electronics technology. The report summarizes study methodology and findings, reviews general CAI literature, and examines specific CAI software that was prepared for the study.

Kenneke, Larry J, Suzuki, Warren N. *Promising Practices in Oregon Career and Vocational Education*. rev. ed. Corvallis, OR: Oregon State University, Vocational-Technical Unit 1981.

This document is a directory of selected special projects in career and vocational education in Oregon. One project using microcomputers is included in the forty-six entries. The project is a CAI application for eleventh and twelfth grade students in the accounting and business machines cluster. The purpose of the project is to teach entry-level accounting and office and clerical skills through an office simulation. A project description is included in the directory.

Kerfoot, Henry B. *The Use of a Microprocessor-Controlled, Video Output Atomic Absorption Specotemoter as an Educational Tool in a Two-Year Technical Curriculum*. Atlanta, GA: Annual Two-Year College Chemistry Conference, 1981.

The article is about the use of a microprocessor-controlled atomic absorption spectrophotometer (AA) for the Instrumental Analysis class at Charles County Community College in Maryland. According to the author, the microprocessor controlled, video-equipped AA has many attributes that make it a meaningful educational tool. He explains these attributes, describes how this tool offers significant advantages to the students, and illustrates differences between AA instruments that are and are not microprocessor controlled.

Leising, James, and Wilkins, Russell. *Inservice Workshops on New and Emerging Agricultural/Natural Resources Occupations: Instructional Materials*, Final Report. Davis, CA: University of California at Davis, 1981.

This document is both a project summary report and a resource guide. The project report describes a statewide survey of microcomputer availability in agricultural departments of California's community colleges. Survey results indicated a severe computer literacy deficiency among faculty. As a result, a decision was made to write a resource guide for the agriculture faculty. The guide (included with this document), includes background technical information, resource selection, guidelines, references, and a listing of over 100 software programs that are available for the agricultural field.

Liffick, Blaise W. "Computer Science and Technology." *On Computing* 2, no. 2 (Fall 1980): 86-89.

This is a description of a two-year (soon to be three-year) course in computer technology at Narragansett Regional High School in Massachusetts. The article describes the planning and implementation process for the course. The author says that students taking the course anticipate computer-related careers as technicians or intend to pursue additional coursework in computer science and electrical engineering.

Merchant, Ronald. "Desk Top Computers." Paper presented at the National Conference on Educational Alternatives for a Changing Society,) Miami, FL, 1981.

This article describes a one-credit, competency-based "Introduction to Microcomputers" course for business students at the Spokane Community College in Washington. Students utilize the TRS-80 Radio Shack computer and complete exercises in flow-charting, simple programming, data entry and correction, and data retrieval.

Merchant, Ronald. "Microcomputers for Everyone." *Business Education Forum* 36, no. 6 (March 1982): 18, 20.

The author describes the evolution of an introductory microcomputer course for business students at Spokane Community College in Washington. The author writes that the course evolved and was designed in response to requests from local businesses. He also says that follow-up student placement surveys with businesses and vocational advisory groups demonstrate that the course meets employer and student needs.

Milam, Ed. "Let the Computer be Your Teaching Aid." *The Balance Sheet* 63, no. 2 (November 1981): 99-10.

The author says that almost any computer in today's market place having a printer and a disk drive can be used for the special task of scheduling students in schools having "open-entry/open-exit" policies. The author does not include a sample program with his article. However, he explains how such a program would work and the capacities it has for administrative management in the open-entry/open-exit environment.

Miller, Dodie. "Using Microcomputers in Accounting Programs." *The Balance Sheet* 63, no. 5 (March 1982): 263-264.

The author says that microcomputers for all business courses at the secondary level are here to stay. She says that because of low equipment costs, software availability, and teacher skill updating, much progress has transpired lately in educational uses of

microcomputers. She relates her experiences using microcomputers for accounting classes. She identifies course objectives and discusses the instructor's role.

Muscat, Eugene. "Microcomputers in Business Education." *Business Education World* 60, no. 4 (March-April 1980): 10-11.

The author says that microcomputers have a wide range of applications in business education programs. In addition to examining CAI and CMI, this article exposes the business educator to equipment and terminology.

Neher, William R., and Hauser, Leopold III. "How Computers Can Help Adults Overcome the Fear of Learning." *Training, HRD* 19, no. 2 (February 1982): 43-50.

Although not written explicitly about microcomputers, the article does examine the general advantages of using the computer for adult training and retraining. The authors provide a list of the ways that a computer can be used for adult-level training and outline the components of a computerized instructional delivery system for adult training.

Orr, William J., Jr. "Committed to Computers: Leto Comprehensive High School." *Florida Vocational Journal* 7, no. 4 (February/March 1982): 8-11.

The author describes various uses of microcomputers at Leto High School in Florida. One of the primary uses is for diagnostic testing and instructional remediation of academically disavantaged vocational students in the school's Individualized Manpower Training System. Other current uses include business education applications. Plans are underway to extend computer use to other vocational students in typing, business communications, law enforcement, masonry, electrical wiring, food preparation, and auto mechanics. CMI applications for instructors are also planned.

Palko, Donald N. and Hata, David M. "Two-Year Computer System Technologies Curricula." *Technological Horizons in Education Journal* 9, no. 3 (March 1982): 69-73.

The authors say that the new computer technology has created a need for individuals with technical skills not envisioned ten years ago. They say that typically, students trained in computer technology at the community college level are trained in either hardware or software systems technology. The authors cite a need for changes in traditional curriculum (e.g., they suggest a need for offering both hardware and software training to students), and outline recommendations for needed modifications in current training practices.

Parrish, Roy James Jr. "Integrating Computer Concepts into Community College Business Curricula." *Renaissance Man: The Key Component. Association for Educational Data Systems Proceedings, 17th Annual Convention*. pp. 215-218. Washington, DC: Association for Educational Data Systems, May 1979.

The author writes that at Danville (Virginia) Community College the approach used to expose students to computer technology has changed from the traditional, introductory data processing course to one that integrates computer methodology into regular course offerings. The author describes the rationale for the change, the implementation process, and subsequent problems. Although direct attention is not focused on the microcomputer, the author suggests that this type of hardware system can easily be used.

"Program Summary—Microprocessing-Computer Technology." Fort Smith, AK: Westark Community College, November 1981. (Descriptive Course Brochure).

This is a summary of a three-year certificate program in microprocessing computer technology. Completion of two years' study leads to an Associate of Arts degree in electronics technology, with the certificate coming at the end of a third-year option. The evolution of the course is traced, the advisory council role is examined, and course goals and content are reviewed.

Robinson, Jerry W., and Johnson, Gary L. "Learning Microcomputing Keyboarding." *The Balance Sheet* 63, no. 5 (March 1982): 228-230.

The authors state that students who will be working with computer terminals on their job need to be taught "keyboarding" skills. They discuss the use of the microcomputer for both teaching the keyboarding skills and monitoring and correcting students' progress. A detailed explanation is provided of both course goals, and specific microcomputer applications within the course.

Russell, Michael. "Marketing and Microcomputers-A Perfect Combination." *The Balance Sheet* 63, no. 6 (April 1982): 292-294.

The author writes about: (1) the use of the microcomputer to assist with the instructional management of vocational marketing courses and (2) the introduction of microcomputer literacy modules into the regular marketing curriculum.

Sadler, Paul. "Microcomputer Construction in High School." *Proceedings of the Annual Convention of the Association for the Development of Computer-Based Instructional Systems.* Vol I. San Diego, CA: Association for the Development of Computer-Based Instructional Systems, 27 February-1 March 1979: 314.

The author describes a high school class in which students actually constructed a microcomputer (a Processor Technology SOL-20 with an 8080A processor chip). The students, from grades nine through twelve, were selected for their mathematics abilities and knowledge of electronics.

Showcase 80: Projects of Excellence in New York State Postsecondary Occupational Education. Albany, NY: New York State Department of Education, Bureau of Grants Administration, September 1980.

This document is a "directory" of exemplary projects in New York State that are judged to be worthy of replication. One project relates to microcomputer use. Career-oriented students at Suffolk Community College in Selden, New York, are given a sequence of three statistics courses. The Basic Statistics Demonstration course (the first of the three) is taught on a microcomputer.

"Special Section: Committed to Computers—Santa Fe College, An Innovative Program." *Florida Vocational Journal* 7, no. 4 (February-March 1982): 16.

The article features a program called Electronics Technology—Industrial Option offered at Santa Fe Community College in Gainesville, Florida. A microcomputer laboratory with a library of professionally written programs has been established for the students. A brief discussion of the course content is provided.

Stocker, H. Robert. "Integrating Computer-Based Technology in the Total Business Education Program." *Business Education Forum* 35, no. 5 (February 1981): 25-26.

The author says that many business programs will have to be altered if they are to survive in the new computer environment. He calls for the integration of the computer into the overall program.

Streichler, Jerry. "Microelectronics—A Challenge to Technology Educators." *Epsilon Pi Tau* 6, no. 2 (Fall 1980): 76-7.

The author reviews the vast range of products and social changes that have resulted or are likely to result from the development of microelectronics technology. He explores these issues in relation to both the technology educator and the technology classroom curricula.

"Teaching Electronics (Application of Microcomputers in Ed/Technical Ed.)." *The Practitioner* 6, no. 1 (October 1979): 9.

The author describes a microcomputer construction course that is part of the technical education curriculum at Sehome High School in Bellingham, Washington. The course is offered by the math department and covers general digital electronics, construction techniques, computer design and logic, and machine language programming.

Tesch, Robert C., Sr. "The Microprocessor: Business Educator Beware." *Journal of Business Education* 55, no. 7 (April 1980): 298-299.

The author provides an overview of microprocessors for business educators. He comparatively examines the Apple II, the TRS-80 Radio Shack, and the Commodore PET. He also explores comparatively the use of manufacturer-supplied programs versus those designed by the individual user.

Tyree, Lawrence W., and Thomas, Ronald C. "Special Section: Committed to Computers—Gulf Coast Community College." *Florida Vocational Journal* 7, no. 4 (February-March 1982): 12-15.

The authors describe a variety of computer applications at the Gulf Coast (Florida) Community College. They state that one of the applications is a popular course—Business Applications of Microcomputers. Students receive hands-on experience with records management, inventory, and accounting applications. They also solve marketing and economic problems using the microcomputer.

Uthe, Elaine. "The Computers in Our Lives." *VocEd* 57, no. 8 (April 1982): 26-29.

The author examines the general changes that miniaturized computers and microprocessors are creating and will continue to create. She then examines the implications of these computer creations for vocational education. She recommends that each vocational program be examined to determine how computer technology can be integrated into the curricula. Specific illustrations are offered for vocational program areas.

"Vocational Education Application of Microcomputers." *The Practitioner* 6, no. 1 (October 1979): 9.

The article is a summary of a vocational education application of microcomputers at Romeo High School in Romeo, Michigan. The Department of Data Processing and Computer

Science offers a vocational curriculum emphasizing computer operations and programming. Students receive exposure to (1) most of the well-known brands of microcomputers, (2) the advantages and limits of each brand, (3) definition of needs for hardware selection, and (4) costs related to software and instructional materials.

Wallace, Ivan G. "Computers in the Typing Class?" *Business Education Forum* 36, no. 2 (November 1981): 27-28.

The author says that for the business and office curriculum it is more sensible to purchase microcomputers than traditional typewriters. The article presents a four-fold rationale showing the advantages of microcomputer purchase.

Wolfe, Neal F. *Instructional Systems Utilizing Modeling and Simulation for Technician Training in the Area of Measurement and Control*. Washington, DC: U.S. Department of Health, Education and Welfare, National Institute of Education, 1978.

The author presents general examples of how computers can be used for certain tasks in technical education. He stresses specifically the teaching of accurate reading techniques for a number of measurements (e.g., current, voltage, decibels, resistance). He suggests other applications for simulations and computer-managed instruction.

Younker, Robert D. "Teacher's Helper, Student's Friend." *VocEd*. 57, no. 3 (April 1982): 42-43.

The author describes a multitude of computer applications at Southfield High School in Oakland County, Michigan. He does not specify which applications pertain to the microcomputer. However, he says the school itself has five Apple IIs, an Altair, and access to a variety of microcomputers at the County Education Center. The applications cover instructional and management uses. Several vocational applications (e.g., teacher reports, automotive, horticultural and home economics) are described.

Zahn, Donald K. "The Impact of the Computer in the Business Classroom." *Business Education Forum* 35, no. 6 (March 1981): 25-26.

The author says business educators must pay more attention to computers in their courses. He writes that the importance of the microcomputer as a tool for developing computer literacy and or managing instructional resources cannot be emphasized enough. He foresees the microcomputer replacing typewriters in business education.

Instructional (Nonvocational Applications)

Alderman, Harry N., II. "Design and Implementation of a Large Scale CMI Project on a Microcomputer System." In *Proceedings of the Annual Convention of the Association for the Development of Computer-Based Instructional Systems VI*. San Diego, CA: Association for the Development of Computer-Based Instructional Systems, 27 February-1 March 1979.

The author presents a profile of a computer-managed instruction project developed for the microcomputer at the Community College of Denver in Golden, Colorado. Included in the profile are (1) hardware; (2) student handling capability; (3) classroom information; (4) storage capability; (5) system expansion capability; and (6) description of informational items available for students, administrators, and general instructional purposes.

Barry, Stephen T. "A Play within a Play: Using the Computer to Teach about Itself." *Technological Horizons in Education Journal* 9, no. 2 (February 1982): 56-58.

The author describes a project using computer-assisted instruction in an industry setting to teach employees how to become computer users. He says that the need for this has grown out of the fact that (1) end-users are not fully exploiting the computer's abilities and (2) the speed of remote and desktop microcomputers has created a rapidly growing need for programming and machine operation training. He explains the overall training design and describes courses for which CAI materials were developed, as well as difficulties encountered during implementation.

Reck, John J., Jr. "A Paradigm for Computer Literacy Training for Teachers." *The Computing Teacher* 9, no. 2 (October 1981): 27-28.

The author emphasizes that preservice and inservice computer education for teachers is needed. He describes some of the skills they will need to acquire, provides a rationale for his statements, and presents a topical outline that can be the basis for a teacher awareness workshop on computers.

Bork, Alfred. "The Educational Technology Center: A Brief Introduction." *Educational Computer Magazine* 2, no. 1 (January-February 1982): 23,24,26.

The author provides a description of the Educational Technology Center at the University of California. The Center promotes the use of computers in the learning process. The author explains the Center's work, its mission, products, and future direction. Much of the article focuses on personal computers and on the fact that the Center is moving increasingly into promoting public understanding of science and into information dissemination (writing, consulting and education workshops.)

Bowers, Susan. "The Impact of Micros." *Recreational Computing* 9, no. 6 (May-June 1981): 34,36.

The author writes about the development of the Academic Computer Center at the University of Wisconsin in River Falls and about the user services it extends to its subscribers (about sixty-five of which are school districts). She reviews the impact that the arrival of microcomputers has had on those services. She also discusses the need for the Center to assume a more active role in the future.

Bristol, John L. "Computer Literacy at Lyons Township High." *VocEd* 57, no. 3 (April 1982): 40-41.

The author writes about a computer literacy program that was planned and implemented in La Grange, Illinois. He says the program plan was developed recognizing four elements of computer instruction—literacy, competency, speciality, and CAI. He discusses the implementation, hardware, costs, and applications.

Burrill, Dwight A. "An Application of Small Personal Computers to an Existing Competency Based Curriculum in a Community College." In *Proceedings of the Fourth International Learning Technology Conference*, pp. 49-51. Orlando, FL: Society for Applied Learning Technology, 22-24 February 1982.

The author discusses the concept of using microcomputer networks at a community college to assist with adminstrative functions and to collect student performance data. He describes

the computer network itself and then describes a software design project currently underway at Howard County (Maryland) Community College that will allow the College to utilize microcomputers for both administrative and CMI functions. He describes the major issues that must be resolved before such a system can become operational.

Cole, Bernard Conrad. "Computer Networks in Education." *Interface Age* 6, no. 10 (October 1981): 88-93.

The author describes how local-level educators, are, on their own, putting together low-cost networks of personal computers ranging from two or three users sharing the same disk to networks of up to sixty-four computers and interconnected local networks of up to several hundred users. He says the networks vastly expand the computing power available to users. He describes how they function and identifies applications for which they are suited.

Ebersole, Gerri Noonan. "Electronic Carrots: Apples and PETs—Including a Whale—Assist Teachers in Moving Students Forward to the Basics." *Today's Education* 71, no. 2 (April-May 1982): 24-26.

The author describes the way she has integrated the microcomputer into her regular math curricula. There are three examples of CAI applications—drill and practice exercises, simulations, and program writing.

Frenzel, Louis E., Jr. "Learning with Micros: Personal Computer Networks for Education." *Interface Age* 8, no. 6 (June 1982): 36-37.

The author describes two information networks that are widely available to personal (i.e., micro) computer owners. These networks are the Source (of McLean, VA) and CompuServe (Columbus, OH). He focuses on educational services available through them. The Source is especially active, according to him, having an agreement with Colorado Technical College that allows subscribers to work toward an Associate of Arts degree in a variety of subject areas.

Gottfried, Phyllis. "Microcomputers in Education: Suggestions for a Shared Approach." *The Computing Teacher* 9, no. 3 (November 1981): 52-54.

The author summarizes the experiences of three New York counties that chose to establish a cooperative approach to utilizing microcomputers in education. She describes a special center that the three counties have established as well as the services it extends to the counties' schools.

Grossnickle, Donald R., and Laird, Bruce A. "Profile of Change in Education: A High School Uses Microcomputers." *Educational Technology* 21, no. 12 (December 1981): 7-11.

The article is a summary of microcomputer use in Palatine High School, located in suburban Chicago. The article is not written as a success story. Rather, it is written in such a way that the essential organizational issues (e.g., the school's computing history, hardware selection, implementation plan) related to adopting, introducing and implementing an innovation such as the microcomputer into the schools can be defined.

Gundlach, Aly. "Managing Instruction with a Micro—The First Steps." *Microcomputers in Education: Getting Started. Conference Proceedings*, edited by Nancy A. Watson, pp. 1.44-I.52. Tempe, AZ: Arizona State University, College of Education, 16 January 1981).

The author says that the microcomputer can be an aid to managing a very complex, sophisticated, instructional program. However, he writes that educational administrators must do their homework before beginning to create the necessary base files. The author addresses this issue, using the illustration of a CMI microcomputer project in the Phoenix, Arizona Elementary School District.

Holub, Donald L., and Wagstaff, Rita R. "Introducing Microcomputers into the Community College. Some Expected Outcomes and Some Surprises." In *Proceedings of the Fourth International Learning Technology Conference*, pp. 45-48. Orlando, FL: Society for Applied Learning Technology, 22-24 February 1982.

The authors write about Cuyahoga Community College's (Cleveland, Ohio) experience with integrating microcomputers into the overall educational framework of the school. The paper describes the planning process, the implementation process to date, and plans for future expansion. A detailed discussion is provided of (1) actual training offered to staff, faculty, and students and (2) training outcomes.

Holznagel, Donald C. "From Timesharing to Microcomputers." In *Renaissance Man: The Key Component*, pp. 351-355. Association for Educational Data Systems Conference Proceedings. Washington, DC: Association for Educational Data Systems, 14-18 May 1979.

The author writes about the shift from time-sharing computers to a combined time-sharing and microcomputer system for the Minnesota School District's Data Processing Joint Board (TIES system). He describes (1) the rationale for the change; (2) the advantages microcomputers bring to the system; and (3) the implementation process.

"How-To Computer Projects Help Educators." *Wisconsin Center for Education Research: News*. (Fall-Winter 1981): 4.

The article is a summary of efforts to be taken at the Wisconsin Center for Education Research to help educators become acquainted with the computer. Mentioned are (1) a conference; (2) a newsletter; (3) a book showing educators how to enter the microcomputing field and locate helpful resources; (4) a software evaluation tool; and (5) inservice training.

Jelden, J. L. "The Microcomputer as a Multi-User Interactive Instructional System." *AEDS Journal* 14, no. 11 (Summer 1981): 208-217

The author reports on the results of a four-year study he conducted using the microcomputer as a time-sharing, interactive instructional system. He reports on hardware and software considerations, lesson and courseware design, human factors to consider in CAI development, and instructor skills. His overall conclusion is that interactive microcomputer instruction is beneficial for students, but extensive teacher inservice training is needed for effective classroom use of the technology.

Kearsley, Greg P.; Hillelsohn, Michael J.; and Seidel, Robert. "Microcomputer-Based Training in Business and Industry: Present Status and Future Prospects." *Journal of Educational Technology Systems* 10, no. 2 (1981-82): 101-108.

The authors conducted a survey of 160 major corporations to learn how (or if) these companies used the microcomputer in their training departments. The paper is a summary of study findings. It also draws a comparison between private and public sector applications of microcomputer training.

Kearsley, Greg; Hunter, Beverly; and Hillesohn, Michael. "Computer Literacy in Business and Industry: Three Examples Using Microcomputers." *Educational Technology* 22, no. 7 (July 1982): 9-14.

> The authors say that although many private sector firms have invested considerable money to train employees for specific computer skills, few have focused attention on computer literacy training. The authors have developed three microcomputer workshops, one each for managers, small business owners, and training managers, designed to provide computer literacy training. The article is a description of the workshops and an assessment of resultant strengths and weaknesses.

Kelvin, Alice. "On-the-Tube Training." *Output* (July 1981): 36, 38, 66.

> The author writes about the combined CAI and videotaped instruction that the Rego Manufacturing Company is using to teach new skills to the firm's factory workers. The system in use—called CAVRI—is an electronic circuit board that allows a microcomputer to control a videocassette recorder and a television monitor. The author describes the system and provides a detailed discussion of its operation.

Krause, Carl W. "Cupertino School District Develops Computer Literacy Curriculum." *The Computing Teacher* 9, no. 1 (September 1981): 27-34.

> The article contains a detailed listing of goals and student objectives for K-8 computer education programs in Cupertino, California, schools. The objectives and goals are, for the most part, integrated into regular course offerings (e.g., social studies, language arts) rather than separated into a singular course.

Lambrecht, Judith C. "New Microcomputer Teaching Competencies." *The Balance Sheet* 63, no. 5 (March 1982): 233-236, 278.

> The author says that with the growth of microcomputers, it is quite likely that classroom teachers will need to demonstrate computer literacy skills. For business teachers, this already means an ability to select hardware and software. She provides a detailed discussion of issues, considerations, questions, and applications that are designed to help business educators attain this and other related competencies.

Luehrmann, Arther. "Computer Literary." *The Computing Teacher* 9, no. 7 (March 1982): 24-26.

> The author briefly reviews the current situation regarding computer education in the nation's elementary and secondary schools. Then, based on his observations, he draws conclusions about the impact of the current situation for the country's colleges and universities. Finally, he makes a three-year forecast about the type of computer training that will be available to students in 1985.

McIsaac, Donald N., and Baker, Frank B. "Computer-Managed Instruction System Implementation on a Microcomputer." *Educational Technology* 21, no. 10 (October 1981): 40-46.

> The authors describe and explain the creation of an integrated hardware-software microcomputer system designed for CMI applications. The system, called MICRO-SIM, was developed at the University of Wisconsin. The system's capabilities and the benefits that result from its use are described.

Meuer, Leonard, T. "Put to the Test by a Computer." *Microcomputing* 5, no. 11 (November 1981): 178.

The author writes about the use of a Commodore PET microcomputer for administering competency exams for graduating high school seniors in the Travis, Unified School District in California. He summarizes positive results regarding student motivation, cost-savings, and similar issues.

Quy, Nguyen Duc, and Covington, Jon. "The Microcomputer in Industry Training." *Technological Horizons in Education Journal* 9, no. 3 (March 1982): 65-68.

The authors write that the creation of the microcomputer has opened many new opportunities to corporate training directors. In this article they review a random sampling of microcomputer uses for training in a number of corporations. They state that the major uses include basic skills, drill and practice, simulation, and training for customers.

Rogers, Jean B. "An Introduction to Computers and Computing: A High School Course Outline." *The Computing Teacher* 8, no. 7 (1980-1981): 30-33.

This article provides a topical study outline for a thirty-two week course in computer literacy and awareness. Four main areas are explored in the course outline—applications, programming, the computer environment, and the social impact of computers. The course is designed for general education.

Towne, Douglas M., and Munroe, Allen. *Generalized Maintenance Trainer Simulation: Development of Hardware and Software. Final Report.* San Diego, CA: Navy Personnel Research and Development Center, April 1981.

The authors describe the development of a general maintenance training simulator (GMTS) that helps the Navy with CAI-type instruction related to equipment maintenance and use. They discuss the design issues, the field test results, issues related to software development (e.g., transportability to more than one microprocessor), and potential uses for the GMTS.

Walters, Gregory, M. "A Guide for the Design and Implementation of a Microcomputer-Based Learning Lab." *Educational Computer Magazine* 2, no. 1 (January-February 1982): 26-29, 47-49.

Using his own experience as a guide, the author provides a step-by-step description of issues to be addressed in the design of a school computer lab. He describes in detail both the planning and implementation process. Advice, including a list of planning questions and floor plans, is included for those wanting to establish a similar center.

Weimer, Jim. "Implementing Computer Literacy and Computer Programming in a Small School." *The Computing Teacher* 9, no. 4 (December 1981): 15-21.

The author describes his experiences developing a computer literacy and programming course in a small Papua, New Guinea School. He offers a complete, step-by-step discussion of course development and implementation. He offers advice for microcomputer purchasing and for instructors or administrators who are developing CAI or computer literacy programs for small schools.

Zosel, Gary. "Computers and the Media Center: A Principal's Perception." *The Computing Teacher* 9, no. 7 (March 1982): 34-37.

The article is an overview of the use of microcomputers in the Media Center at Elmira High School, Elmira, Oregon. Both vocational and nonvocational uses are described. The author examines the Center's activities and staffing, and offers advice to others wishing to establish a media center.

Institutional Management Applications

Akers, Robert L. "Database Scorecard." *Microcomputing* 6, no. 4 (April 1982): 46-48, 50, 52, 59-60, 62.

The author provides a descriptive review and overview of major database management systems that are presently available for microcomputers. He says that the objectives and quality of these systems vary widely. Consequently, he recommends a hands-on experience before purchases are made. He evaluates the different systems and suggests issues for the buyer to consider. Comparative charts are included.

Bolton, Brenda Anthony. "Student Scheduling and Tracking System for the Microcomputer." *Educational Computer Magazine* 2, no. 2 (March-April 1982): 24-26.

The author describes a microcomputer administrative application that is being used at W. P. Davidson High School in Mobile, Alabama. A microcomputer is presently used for student scheduling and recordkeeping. Plans are being made to use the microcomputer for student attendance, mailing lists, and report cards.

Cox, John. *Documentation—INFO: A Small Computer Data Base Management for School Applications.* Urbana, IL: Illinois University, Department of Secondary Education, 1979.

The paper is a documentation of a computer system called INFO. Originally developed for student recordkeeping for graduate students at the University of Illinois, the program is, according to the author, general enough to be used in public schools for many types of administrative recordkeeping, including inventories of classroom materials. The program was written for a DEC timesharing computer but was modified for an 8080 microcomputer and floppy disks. The author discusses drawbacks of the system and a list of the programs that are part of the system.

Hierstein, William J. "Projecting Enrollments for Elementary and Secondary Schools." In *Renaissance Man: The Key Component. AEDS Proceedings, 17th Annual Convention*, pp. 259-261. Washington, DC: Association for Educational Data Systems, 14-18 May 1979.

The author writes that school executives today are quite concerned with population trends. He writes about the importance of choosing a forecasting technique in order to get an accurate enrollment projection. A software program called INEROL is one that he recommends for population forecasting. The program is simple to use and can be adapted easily to the microcomputer.

Hooper, George A. "Computerize Your IEPs." *Classroom Computer News* 2, no. 2 (November-December 1981): 34-37.

The author writes about his experiences using a microcomputer for producing Individualized Education Plans for handicapped students. He says that the microcomputer can also be used for other administrative tasks such as tracking student progress and completing or printing other standardized forms.

Judd, Dorothy H. "Administrative Decision Tools: A Microcomputer Reality Available Now." *Educational Computer Magazine* 1, no. 2 (July-August 1981): 6-7.

The author identifies and examines several software packages that can make the microcomputer into an effective administrative tool. She notes a volume of six administrative microcomputer programs published by the Northwest Educational Computer Lab (included are three simulations for school bus routing, teacher absenteeism, and enrollment). Potential applications are discussed. VisiCalc is examined for its educational administrative potential.

Judd, Robert C. "Can the Microcomputer Assist in Data Base Management? The Who, What, Where, and How for School Administrators." *Educational Computer Magazine* 2, no. 1 (January-February, 1982): 20-22.

The author examines the pros and cons of using microcomputers for school data management and administrative record keeping. He says that for district-wide information needs, the memory space is not sufficient. However, on a school-by-school basis, the microcomputer is excellent. He offers illustrations of potential administrative applications.

Mazurek, John M. *Computerized Purchasing*. New Orleans, LA: Association of School Business Officials, 26-30 October 1980.

The author examines the advantages of a computerized, automated purchasing department, whether in an industrial, educational, or government office. He discusses the pros and cons of each of the three major computer systems (i.e., the mainframe, the mini, and the micro) for this type of application.

Raucher, S. M. "Logical Distributed Data Processing for Local School Districts." *Renaissance Man: The Key Component. AEDS Proceedings, 17th Annual Convention*, pp. 291-294. Washington, DC: Association for Educational Data Systems, May 1979.

The author describes how the Montgomery, Maryland, public school system uses microcomputers, minicomputers, and mainframes to dispense fuel, maintain records of gas consumption, and substantiate claims for state reimbursement of transportation costs.

General Purpose

Denis, J. Richard. *Practicum Activities for Training Teachers to Use Computers: The Illinois Series on Educational Application of Computers*, No. 21E. Urbana, IL: Illinois University, Department of Secondary Education, 1979.

> The author lists twenty-five objectives that teachers who will be teaching with computers should meet. He then offers specific tasks that can be used to help instructors meet the objectives.

Douglas, Charles H., and Edwards, John S. "A Selected Glossary of Terms Useful in Dealing with Computers." *Educational Technology* 19, no. 10 (October 1979): 56-66.

> The article is a glossary of microcomputing terms. The terms are selected from advertisements, catalogs, microcomputer manuals, dictionaries, textbooks, and conversations with persons who work with microcomputers. Definitions are generally presented in a nontechnical language.

Frederick, Franz, J. "Inside Microcomputers: What is a Micro? A Bus? A Floppy Diskette?" *Today's Education* 71, no. 2 (April-May 1982): 17-19.

> The author presents an overall, easy-to-understand guide to microcomputers and the terminology associated with their use. He identifies the individual components of a microcomputer system and explains how the components interrelate.

Gleason, Gerald T. "Microcomputers in Education: The State of the Art." *Educational Technology* 21, no. 3 (March 1981): 9-18.

> The author writes about the use of microcomputers for CAI in varied educational settings. The focus of his work is issues and concerns related to (1) hardware; (2) software; (3) computer literacy; (4) research needs; and the (5) future of microcomputer use.

Hughes, Elizabeth M. "A Beginner's Guide to Memory." *On Computing* 3, no. 1 (Summer 1981): 18-26.

> The author provides a useful, detailed explanation of computer memory that is especially suited to newcomers to the microcomputing field. She indicates that knowledge of memory capacity and capability is important for those who are selecting a microcomputer.

Kellish, Frederick J. "Computer Graphics on a Shoestring." *Instructional Innovator* 26, no. 6 (September 1981): 19-23, 38-39.

> The author provides a comparative guide to the graphics capabilities of varied microcomputer systems. He includes hardware and software listings, vendors' addresses, product descriptions, and a reference chart comparing the capacities of individual systems.

Lawson, Harold W., Jr. "Explaining Computer Related Concepts and Terminology." *Creative Computing* 7, no. 10 (October 1981): 92, 94, 96, 97, 98-99, 100, 101.

The author offers a step-by-step method for teaching and instructing novices about the computer and its use. The method is pictorial, includes concepts and terminology, and is appropriate for computer literacy and awareness training.

Minc:, Barbara B. "Resources Are Macro for Micros." *Instructional Innovator* 26, no. 6 (September 1980): 29-32.

The author presents listings of resources for varied aspects of microcomputer use. Although the listings are dated, they are good reference points. Included are (1) hardware and software companies; (2) general periodicals and newsletters; (3) user groups, (4) book publishers; and (5) material for further, in-depth study.

Mitchell, Robert; Kildall, Gary; and Bisceglia, Lufgit. "Fortran, PL/1-80, Forth." *Interface Age* 8, no. 6 (June 1982): 71.

The author presents an overview of programming languages most commonly used for microcomputing.

Mowe, Richard. "Computers & Teaching Computeach." *The Computing Teacher* 8, no. 9 (Academic Year 1980-1981): 42-50.

The article is a guide for teachers who wish to begin computer awareness and literacy programs in their school districts. The author offers ideas for program development and implementation.

Piorot, James L. *Computers and Education*. Austin, TX: Sterling Swift Publishing, 1980.

The book is a comprehensive overview of educational applications of computers for administration and instruction. The book is written for the novice and covers both micro and mainframe computers. This resource is appropriate for self study, and for teacher inservice programs.

Prentice, Lloyd R. (Ed.). *Classroom Computer News* 1, no. 6 (July-August 1981).

The entire issue of this periodical is a reference guide for those interested in educational applications of microcomputers. Articles are grouped under the general headings of Hardware, Software, Languages (programming), and Resources. For the novice, this is a good resource for gaining an overview of the educational computing field. For those wishing to gain more expertise, the articles in this issue provide direction and guidance.

Starr, Leon. "A Programming Primer—Part II." *Personal Computing* 6, no. 4, (April 1982): 72-76, 78, 80, 160.

This article acquaints the reader with the terminology, form, and application of the BASIC programming language.

The, Lee. "Educational Software for the Home: What Can Parents Do This Summer to Help Kids Next Fall." *Personal Computing* 6, no. 6 (June 1982): 48, 50, 52, 103, 106, 108, 110, 114.

The author mainly has written a guide on educational software for parents who wish to assist with their children's education at home. The article is useful to all, however, for its review of issues surrounding software use and selection, and its listing of educational software companies.

Willis, Jerry, and Miller, Merl. *Computers for Everybody*. Beverton, OR: Dilithium Press, 1981.

This book, written for the general public, is a broad, easy-to-read overview of microcomputers. Covered in the book are topics such as (1) hardware, software and peripherals selection; (2) terminology; (3) software listings; (4) computers for business and home use; and (5) annotations of additional resources.

How to Select a Microcomputer

All About Personal Computers. Delran, NJ: Datapro Research Corp., 1980.

In this report, the development of the personal computer is discussed, current applications are explored, and future trends are projected. An outline of how to select a computer, profile reports of best-selling computers, and directories of hardware and software vendors are included.

Behling, Robert P., and Brooks, Lloyd D. "Microcomputer Selection Needs Careful Evaluation." *Business Education Forum* 36, no. 3 (December 1981): 30-31.

The authors present a discussion of critical issues that must be resolved before a microcomputer is purchased for a school or school district. They examine manufacturer performance claims, stated and hidden system costs, software purchase, teacher training, and needed system capacities.

Botterell, Art. "Which Micro for Me?: A Guide to the Prospective User." *Educational Computer Magazine* 2, no. 1 (January-February 1982): 30-31, 50-51.

The author has prepared a general, well-rounded guide for educators who are selecting a microcomputer. He considers: (1) the central processing unit and supporting peripherals; (2) software; (3) potential applications; and (4) problems and limitations related to microcomputer use.

Desposito, Joe. "Computers: Which One Is for You? Personal, Professional, Educational, Small Business." *Popular Electronics* 19, no. 5 (May 1982): 46-50, 54, 56, 58, 60.

The author provides a general yet comprehensive discussion of computer selection for the following uses: personal, professional, educational, small business and kit building. In the educational arena, he also examines (1) the choice of programming language; (2) the software controversy and resources; and (3) the development of programs for computer literacy.

Dusseldorp, Ralph Van, and Spuck, Dennis W. (eds.). "Microcomputers: Their Selection and Application in Education: Special Issue." *Journal of the Association for Educational Data Systems* 13, no. 1 (Fall 1979).

The entire issue of this journal is devoted to microcomputers, and their selection and use in education. Information about specific hardware systems is dated, but other materials (e.g., selection procedures, issues, concepts) are valid. Four themes run through the issue: (1) Microcomputers in Education, (2) Selecting a Microcomputer, (3) Software Development, and (4) Microcomputer Applications.

Erickson, Jonathon. "What Popular Computers Can't Do." *Popular Computing* 1, no. 1 (November 1981): 52, 54, 56.

The author provides a listing and explanation of a computer's limitations and specific tasks that a computer *cannot* do. The article raises issues that need to be considered by the consumer.

Fox, Tom. "Personal Computers—Take Your Pick." *Interface Age* 6, no. 4 (April 1981): 46-49.

The author has assembled an introductory narrative and a comparative chart of microcomputer systems designed to help the consumer make a knowledgeable, informed purchase.

Frederick, Franz J. *Guide to Microcomputers.* Washington, DC: U.S. Department of Health, Education and Welfare, National Institute of Education, 1980.

The author has written a comprehensive, in-depth guide to microcomputers and an overview of their use in education. The book is divided into fourteen chapters, each dealing with a specific aspect of selection and use. Resource listings and guides are included.

Lobello, Tony. "The Watch Word Is 'Caveat Emptor'." *Electronic Education* 1, no. 5 (January 1982): 19.

The author writes about the need for educators to carefully define their expectations for a microcomputer before one is purchased. He suggests that too many educators have unrealistic expectations. The result is disappointment and a failure to use the microcomputer to its fullest potential.

Marbach, William D; Lubenow, Gerald C.; Cook, William J; Gidney, Frank, Jr.; and Willeson, Kim. "To Each His Own Computer." *Newsweek*, 22 February 1982, pp. 50-56.

The authors provide an introductory yet comprehensive overview of microcomputing. They compare microcomputers to mainframe computers, review potential applications (education included), discuss software issues, and present comparative pricing and purchasing information.

Meilach, Dona Z. "Ten Steps to Take Before You Buy a Computer." *Interface Age* 8, no. 6 (June 1982): 66-69.

The author presents step-by-step, practical advice, to those who are about to purchase a micro or personal computer. She emphasizes the need to gather information and make careful comparisons among systems.

Miastkowski, Stan. "Choosing Your Popular Computer." *Popular Computing* 1, no. 1 (November 1981): 16-18, 20, 22-23.

The author helps the consumer to address two difficult issues: (1) choosing the correct microcomputer, and (2) choosing a microcomputer supplier. He suggests that the consumers may wish to consider the need for text editing, music or speech generation, and inventory applications before making a final purchase. Then he explores the pros and cons of purchasing the microcomputer from (1) a computer store; (2) a retail department store; (3) an office equipment dealer; and (4) a computer manufacturer.

Miastkowski, Stan. "A Computer for Your Small Business." *Personal Computing* 1, no. 1 (November 1981): 35-36, 38-40.

> The author examines a variety of reasons for having a small computer to assist with small business and administrative tasks. He examines pros and cons of using a micro for accounting and for payroll and inventory tasks, answers questions about cost-effectiveness, and presents a sampling of software information.

Milner, Stuart. "How to Make the Right Decisions about Microcomputers." *Instructional Innovator* 25, no. 6 (September 1980): 12-19.

> The author presents a general overview of microcomputers and their educational applications. He describes microcomputer operations, computer-based instruction and computer literacy skills.

Muiznieks, Viktors. *A General Introduction to Microcomputers*. Urbana, IL: Illinois University Department of Secondary Education, November 1978.

> The paper is written for use in the Secondary Education Department at Illinois University. It addresses the question of what a microcomputer is and reviews technical concepts such as memory, storage, binary numbers, and controlling logic. Illustrative drawings and definitions are included.

Poppelbaum, T. L. "Match Your New Computer to Your Needs." *On Computing* 3, no. 1 (Summer 1981): 30-34.

> The author describes an evaluation method the novice can use for selecting a microcomputer. He indicates resources and information that are available to the novice and specific features that should be considered before a microcomputer is purchased.

Quinones, Wendy. "What Is a Popular Computer?" *Popular Computing* 1, no. 1 (November 1981): 26-28, 30.

> The author offers an introduction to microcomputers and computing for the novice computer consumer and owner. The author's position is that users do not have to be experts in computer operations. However, a minimal knowledge of basic terms is desirable.

Schwartz, Barbara. "Let the Buyer Beware: Choosing the Right Computer Store." *Personal Computer* 5, no. 1, (November 1981): pp. 82-84, 86, 88.

> The author says that once a consumer has chosen a particular microcomputer system, serious thought needs to be given to the retail outlet from which the system is purchased. She explains the type of relationship that can develop between retailer and consumer and offers specific questions that the consumer should ask of a potential supplier.

Staples, Betsey. "Van Helps Schools Select the Right Computer." *Creative Computing* (March 1981): pp. 106-108, 110, 112.

> The author writes about a project in Pennsylvania that has been designed to assist educators and administrators with the selection of microcomputer hardware and software for their classrooms. The state Office of Education funds a mobile van that travels to schools and offers training and information about computer use and purchase.

Webster, Anthony. *Microcomputer Buyer's Guide*, Rochelle Park, NJ: Hayden Book Co., 1981.

The author has prepared detailed information on the different microcomputers that are available. Included is information about operating systems, high level languages, applications packages, printers, terminals, and cathode ray tube displays.

Zakariya, Sally Banks. "Selecting a Microcomputer for Your School." *National Association of Elementary School Principals* 5, no. 13 (30 March 1982): 1, 3-6.

The article is a guide for selecting school microcomputers. The author offers general suggestions for acquiring background information and specific procedures to follow in the selection process.

Software Selection Guides

The Computerist's Directory: The National Phone Book of Computing. Guerneville, CA: Alternet, Inc., 1982.

This is a directory that carries resource listings for all aspects of computing. A white pages section and a yellow pages section are included. The white pages contain noncommercial listings (usually names and addresses of individual computer users) alphabetically by state. The yellow pages contain commercial listings alphabetically by topical headings. A major section on software selection is included.

Computer Software Resource List. Arlington, VA: Educational Research Service, Inc., 1982.

This is a resource listing that highlights some of the basic resources available to help school administrators become informed about computer software, and microcomputer applications to education. Included are sample annotated listings of organizations, catalogs, and directories.

Lathrop, Ann. "Building the Software Collection: Part III." *Educational Computer Evaluation* 2, no. 1 (January-February 1982): 16-17, 52-53.

The author supplies information about several organizations that can assist educators with software selection and evaluation.

Lubar, David. "Another Look at Educational Software and Books." *Creative Computing* 7, no. 1 (January 1981): 36-39.

The author makes the statement that there is uncertainty about the most effective ways to use software (e.g., should software replace books in the classroom, or merely supplement other instructional materials). He explores this debate and reviews several instructional materials that may be of use to the educator.

Lubar, David. "Educational Software and Books." *Creative Computing* 7, no. 10 (October 1981): 54, 56, 59, 60.

The author provides a review of several software packages. He also recommends several resources to aid educators with software selection, use, and evaluation.

School Microware Directory: A Directory of Educational Software for Apple, Atari, PET, TRS80. Dresden, ME: Dresden Associates, 1981.

This is a software directory of educational microcomputer products published twice yearly. It contains descriptions of software programs classified by subject and hardware system. There is a special section on administrative applications and a listing of software vendors. Each issue of the directory is cumulative.

Selected Microcomputer Software. Chatsworth, CA: Opportunities for Learning Inc., Fall 1981.

This is a collection of selected software programs and packages for the Apple, TRS-80, PET, and Atari microcomputers. Packages are for a variety of educational and administrative applications. For each package there is a profile containing the following information: (1) a program description; (2) the hardware system for which the program was written; (3) whether the program runs on a disk or cassette; and (4) price.

Skoman, Lucia. "Organizing a Microcomputer Software Collection." *The Computing Teacher* 9, no. 2 (October 1981): 55-56.

The author explains how the Regional Education Media Center in Michigan (where she is a librarian) handles the organization of its software collection. She describes in detail the classification system, the processing system, and the check-out process.

Teacher and Inservice Education

Burke, Michael A., and Kaiser, Jerry. "OK, Who Took a Byte from My Apple ROM?" *The Computing Teacher* 9, no. 8 (April 1982): 36-37.

The article is a guide for those wanting to design an inservice computer training program for teachers. The program design is in the form of a summer camp rather than an "after hours" or a university continuing education course.

Cornelius, Richard. "WHATSA Computer?—An Evening Continuing Education Course." *The Computing Teacher* 9, no. 2 (October 1981): 47-48.

The author writes about a university continuing education course he has developed to present both computer literacy and beginning aspects of programming. He presents a course outline for eight sessions, each lasting for two hours. The course covers the importance of computers, computer jargon, capabilities and limitations of computers, and computer program development.

Denis, J. Richard. *Teacher Education in the Use of Computers*, The Illinois Series of Educational Application of Computers, no. 13. Urbana, IL: Illinois University, Department of Secondary Education, 1979.

The concern of the author is how to prepare teachers and educators to teach with computers, not to teach others about computers. The author presents a pre- and an inservice model for training teachers to integrate computers into their regular teaching routine.

Hector, Judith H. "Certification of Pre-College Teachers of Computing." *The Computing Teacher* 8, no. 4 (1980-1981): 43-45.

> The article is a summary of a survey that the author conducted to assess certification requirements for secondary-level computer sciences and data processing instructors.

Hedges, William D. "How to Introduce Teachers, Principals, and Curriculum Personnel to the Microcomputer." *The Computing Teacher* 8, no. 5 (1980-1981): 45-46.

> The author offers guidelines on how best to introduce adult educators to the use of the microcomputer. The guidelines can be used for inservice education programs.

Johnson, Jo Rykken. "Making the Transition to Computers Easy: Steps to Take in Inservice Training." *Educational Computer Magazine* 1, no. 2 (July-August 1981): 16-19.

> The author presents an inservice training model to help teachers and staff utilize computers for instructional purposes. She focuses her efforts on computer operations rather than on computer programming.

Koetke, Walter. "Will Teachers Learn to Program?" *Microcomputing* 6, no. 4 (April 1982): 22-23.

> The author explores the debate about the need for general educators to learn computer programming skills. He says teachers should learn to program and presents a rationale for the belief.

Lowd, Beth. "Heading-Off Hang Ups." *Classroom Computer News* 2, no. 1 (September-October 1981): 8.

> The author has compiled a list of concepts and tasks the novice computeruser should grasp in order to use a computer with confidence. The list can be used as a guideline for those developing inservice programs.

Mathes, Stanley L. "Using Microcomputer Graphics to Train Teachers." *Creative Computing* 8, no. 4 (April 1982): 88, 90, 92, 93, 94.

> The author demonstrates how teachers and instructors in inservice training programs can be taught programming concepts through the use of computer graphics. This is in contrast to traditional methods that focus on computer programming and the use of repetitive calculations.

Olds, Henry F., Jr. "Teaching the Teachers: An Inservice Syllabus." *Classroom Computer News* 2, no. 1 (September-October 1981): 12-15, 40-41.

> The author offers a list of resources that is helpful for those who are teaching general educators about computers. He discusses the components of a successful inservice program.

Rawitsch, Don G. "Lessons Learned on the Inservice Trail." *Classroom Computer News* 2, no. 1 (September-October 1981): 16-17.

> The author discusses the difficulties that can arise for the trainer who provides inservice computing training to educators. He also explores methods and approaches that are effective for training delivery.

Rawitsch, Don G. "Teaching Educators about Computing: A Different Ball Game." *The Computing Teacher* 9, no. 4 (December 1981): 27-31.

The author explores methods that are most effective for teaching the general educator about computers. He says the general educator has special needs and requirements that are often overlooked in traditional computer education courses. Recommendations for a successful training course are included.

Bibliographies, Directories, and Databases

Botken, James W., et al. *Towards a More Effective Technology and Learning: New Directions for Educational Technologies in the 1980s: Research and Studies*. New York, NY: International Center for Integrative Studies, 15 September 1980.

The authors have prepared a compendium of selected research studies and projects focused on educational technology for the 1980s. They present a brief introduction that defines and reviews major technological trends. Following this is a series of project descriptions that indicate who is doing what in the field of educational technology. Project descriptions, contact people, and related references are included with each description. An annotated bibliography of relevant materials is included.

Colsher, William L. "Special Interest Microcomputing Publications." *On Computing* 2, no. 2 (Fall 1982): 60-64, 65-66.

The author reviews a variety of special-interest microcomputing publications. He briefly describes the contents of each publication and provides subscription information.

Hall, Keith A. *Computer-Based Education, The Best of ERIC, June 1976-August 1980*. Syracuse, NY: ERIC Clearinghouse on Information Resources, Syracuse University School of Education, November 1980.

This is an annotated bibliography on computer-based education (includes CAI, CMI, interactive instruction, and instructional simulations) compiled from ERIC or journals indexed in the *Current Index to Journals in Education* from June of 1976 to August of 1980.

Howard, Phillip C., ed. *Computer Literature Index*. Phoenix, AZ: Applied Computer Research, 1981.

This index is published four times per year. Each issue carries citations from periodicals and books that focus on the practicing end of the computer profession. As such, highly research-oriented subject matter is not included. Most periodicals are computer-related trade publications, general business and management periodicals, and publications of professional societies. The index is organized by subject and by author.

Information Resources On—Microcomputers: A Sampling of the ERIC Database. Syracuse, NY: ERIC Clearinghouse on Information Resources, Syracuse University School of Education, 1982.

This is a four-page bibliography of references on references on microcomputers. Citations were selected from ERIC indexes, *Resources in Education*, and *Current Index to Journals in Education* for 1981 and 1982.

Citations are listed according to (1) overview, (2) computer literacy, (3) hardware, (4) software, (5) elementary/secondary education, and specific applications.

Kurshan, Barbara. "Computer Literacy: Finding Effective Resources." *Recreational Computing* 9, no. 4 (January-February 1981): 45-47.

The author presents a resource list and a bibliography that can assist educators with the development of materials for computer literacy and awareness training. Areas for which listings are provided include (1) general; (2) hardware; (3) programming; (4) software and data processing: (5) applications; and (6) attitudes, values and motivation, and other resources.

Laubacher, Marilyn R. *In Brief . . . Microcomputers: Some Basic Resources*. Syracuse, NY: ERIC Clearinghouse on Information Resources, Syracuse University School of Education, April 1982.

This is a four-page resource and reference guide for individuals who wish to know more about microcomputers and their educational uses. Specific resources and documents have been grouped according to categories that provide answers to questions such as (1) "What are good sources of information about microcomputers for people with no background"? (2) "How can I decide which microcomputer to buy?"; (3) "How can I find out about other schools' applications?" Included are organizations, journals, books, and database references.

Michelsen, Jim, *A Survey of Computer-Related Periodicals*. Lansing, MI: Michigan State Department of Education, Bureau of Library Services, 1981.

The author has compiled a listing of over sixty computer-related periodicals. Two criteria were used primarily for the selection: (1) the periodical is published in the United States; and (2) the publication was of interest to the general user of computers or microcomputers. A brief annotation of each periodical's content is included, as is subscription information. Special note is made of periodicals most suited for first acquisitions for libraries.

Microcomputer Directory: Applications in Educational Settings. 2d. ed. Cambridge, MA: Harvard University Graduate School of Education, 1982.

The staff of the Gutman Library of Harvard University's Graduate School of Education have compiled a directory of educational applications of microcomputers. There are 900 entries representing 1,200 individual schools or other educational settings, and over 1,000 different teachers, media specialists, principals, educators, parents, and student leaders. Entrees are arranged alphabetically by state. Each one includes addresses, contact persons, hardware and software utilized, funding sources and a short project description. Subject-specific indexes (e.g., vocational education, computer assisted instruction, administration) are included.

Miller, Inabeth. *Microcomputers and the Media Specialist: An Annotated Bibliography*. Syracuse, NY: ERIC Clearinghouse on Information Resources, Syracuse University School of Education, 1981.

This bibliography organizes citations of recent journals and periodicals, books and reports into categories that are especially significant for the work of media specialists. The author says that the selection of citations is not comprehensive or systematic in a scholarly sense; rather, it is pragmatic and utilitarian. Citations (250 in all) are grouped and annotated

according to (1) general interest; (2) hardware; (3) software; (4) educational applications; (5) library applications; (6) alternative sites; (7) games/toys; (8) computer literacy; and future prospects. A listing of relevant journals and an author index is included.

Parrott, Wilbur. "Science Education: A Bibliography." *Classroom Computer News* 2, no. 2 (November-December 1981): 8-9.

The author presents a bibliography of computer-related reports and articles in the science field. The bibliography is especially useful for science educators.

Vogeler, Robert B., *Micro . . . Publications in Review*. Arlington Heights, IL: Vogeler Publishing. Published monthly.

Publications in Review is an index designed for those interested in micro- and minicomputers. The focus is on hardware and software design systems, and the use and application of computers to industry, communication and education. Each issue contains the table of contents of the major publications related to the micro-and minicomputer marketplace. A subject index of articles is also included.

Sample Hardware Reviews

Berger, Ivan. "The TRS80 Model III." *Popular Computing* 1, no. 3 (January 1982): 16-18, 20.

The author provides a profile of this microcomputer's basic features and compares the capacities of this model with an earlier one—the TRS-80 Model I. He specifically mentions the amount of software that is available for this model.

Busch, David D. "VIC-20: Commodore's Entry in the Small Computer Arena." *Interface Age* 7, no. 5 (May 1982): 94-98.

The author reviews the VIC-20 Commodore microcomputer. He focuses on the central processing unit and various add-ons that are necessary to enhance the machine's performance.

Callan, Bob. "A New Entry in the Education Market." *Creative Computing*, 8, no. 4 (April 1982): 50.

The author reviews the Monroe EC880 Educational Computer, a machine that is aimed at the junior high-college market. He stresses the fact that a variety of educational software is being prepared to support the machine.

Edelson, Roger H. "A Personal View of the Atari 800." *Interface Age* 7, no. 5 (May 1982): 58, 60-62.

The author examines the Atari 800. He comments upon its reliable use, comprehensive graphics, extensive peripheral array, and software support. He says the system has shortcomings as a small business system, but excels as a combination game, interactive educational, and home management system.

Finkel, LeRoy. "Classroom Word Processing Hardware—A Minority Report." *The Computing Teacher* 9, no. 1 (September 1981): 59-60.

The author compares the advantages to schools of purchasing microcomputers for teaching word processing rather than speciality word processing machines. He examines word processing course objectives and microcomputer hardware options in relation to those objectives.

Fox, Tom. "The Apple III Bites Again." *Interface Age* 7, no. 5 (May 1982): 67-69.

The author reviews the Apple III. He describes the system's hardware dimensions, comments upon the supporting documentation and training manuals, the array of superior software support, and the machine's utility for many business tasks.

Fox, Tom. "The Latest in Personal Computers." *Interface Age* 6, no. 4 (April 1981): 60-63.

The author defines criteria for identifying a personal computer. Then, using these criteria, he reviews a variety of personal computers, including the Apple II, Atari 400, Casio FX-9000, Commodore VIC-20, Ohio Scientific CIP, Radio Shack TRS-80 Color Computer, Texas Instrument TI-9914, and others.

McWilliams, Peter. "The Osborne I." *Popular Computing* 1, no. 8 (June 1982): 50-52, 54.

The author reviews the Osborne I computer. He comments upon its portability and software support. A profile lists the computer's main features and cost information.

Miastkowski, Stan. "Add a Voice to Your Computer: The Vortpax Type 'n Talk." *Popular Computing* 1, no. 8 (June 1982): 81-82, 84, 86.

The author reviews the Vortax Type 'n Talk speech synthesizer for microcomputers. He presents an overview of the technology behind the synthesizer, and discusses (1) the way to attach it to the computer system; (2) fine-tune its pronounciation; and (3) how to use it for advanced computer applications.

Miastkowski, Stan. "The Commodore Computers." *Popular Computing* 1, no. 3 (January 1982): 22-23.

The article is an examination of the Commodore group of computers (the PET, the CBM, and the VIC-20). Accompanying the article is a profile detailing specific features and costs of each machine.

Miastkowski, Stan. "Small-Computer Printers: Evolution, Competition, and Innovation." *Popular Computing* 1, no. 8 (June 1982): 66-77.

The author provides an overview of printers that are presently available on the market. He examines the current technology, including the daisy wheel revolution, and discusses future directions in printer technology. He includes a comparative listing of available printers and their special features.

Neale, Kathy. "The Atari 800." *Popular Computing* 1, no. 3 (January 1982): 30-32.

The author reviews the Atari 800. In addition to reviewing the main processing unit, she explores its sound and graphics capabilities, its software support, hook-up capabilities, and available peripherals.

Stewart, George. "The Apple II." *Popular Computing* 1, no. 3 (January 1982): 24-26.

The author reviews the Apple II, its capabilities, and the extensive software support for the machine from companies other than Apple. An accompanying profile identifies individual features of the machine, including costs.

Sample Software Programs

Ahl, David H. "Six Business Management Games." *Creative Computing* 8, no. 4 (April 1982): 28, 30, 33.

The author reviews several business management games, most of which have been developed for the Apple. The games are suited for varied ages and educational levels.

Crouse, David B. "The Computerized Gradebook as a Component of a Computer-Managed Curriculum." *Educational Technology* 21, no. 5 (May 1981): 16-20.

The author developed a software program for helping classroom teachers with their grading tasks. The author provides a detailed description of the program and its application(s).

Ditlea, Steve. "Second-Generation Word Processing Programs." *Popular Computing* 1, no. 8 (June 1982): 38, 42, 44, 46.

The author reviews word processing packages and offers purchasing information. He says that a new generation of word processing software is available. The new packages, in addition to featuring reliable editing and formatting capabilities, are easily implemented and well documented.

Frenzel, Louis E. "Learning with Micros: Recent Software Releases." *Interface Age* 7, no. 5, (May 1982): 35.

The author reviews three software packages that are of use and value to educators. Package producers, purchasing information, and hardware that is compatible for the software are identified. The packages include Fractional Sound, Curriculum Manager (for instructional management applications), and a software system for authoring CAI programs.

Good, Phillip. "Beyond VisiCalc: Business Software for Your Personal Computer." *Popular Computing* 1, no. 3 (January 1982): 38, 40-42.

The article is a guide for choosing software for business and administrative applications. Specific software packages are discussed. A directory of business software products and suppliers is included.

Heintz, Carl. "Business Software Forum: Selecting an Accounts Payable/Receivable Package." *Interface Age* 8, no. 6 (June 1982): 72-74, 76-79.

The author reviews twelve software packages appropriate for accounts payable and accounts receivable applications. Procedures and guidelines for selecting the appropriate package are included, as are comparative charts that examine performance, capacities, and costs.

Meilach, Dona. "Spelling Programs: The Proof's in the Printing." *Interface Age* 7, no. 5 (May 1982): 75-76, 78, 81-85.

The author provides an in-depth examination of seven software packages designed to assist with proofreading and spelling correction. She describes what the packages can and cannot be expected to do, their unique features, and how they handle their functions. A comparative chart is included.

Noonan, Larry. "Computer Simulations in the Classroom." *Creative Computing* 7, no. 10 (October 1981): 138.

The author lists a variety of software vendors and educational simulation specialities that can be purchased from them.

Ott, Jack P. "Projection of Teachers' Salaries for Contract Negotiation." *Educational Computer Magazine* 2, no. 1 (January-February 1982): 32-35, 42-45.

The author has written a program (in BASIC) for projecting teacher salaries that is useful to educational administrators or unions involved in contract negotiations. The program itself is included with the article.

Perry, Robert L. "Word Processing: The A to Z of Software." *Personal Computing* 6, no. 3 (March 1982): 73-75, 78, 80, 82-83, 87-88, 98, 100, 104.

The author presents a comprehensive report on word processing software. He identifies features of packages that individuals should consider before purchasing a package. Then he examines software packages individually, compares packages via helpful charts, and offers selection guidelines.

Templeton, Harley, M. "The Computer Tutor." *Creative Computing* 7, no. 20 (October 1981): 150, 152, 154, 156-159.

The author has written two tutorial programs for the TI99/4 microcomputer. The programs permit a teacher or a parent to develop customized tutorials for students. The author provides detailed documentation for the programs (including how to convert them to other systems). Programs are included with the article.

Teoch, W. "Grades—A Class Record Updating System." *Creative Computing* 7, no. 10 (October 1981): 166, 168.

The author has written a microcomputer program in BASIC that assists teachers with the task of maintaining and updating student grade records. The author describes the program in detail and says that if readers contact him, he will share the program with them.

Vann, Eric Geoffrey. "A Gradebook for Teachers." *Personal Computing* 4, no. 8 (August 1980): 53-63.

The author has written a grade-keeping program for science courses which, he says, can be transferred easily to other subjects. He provides a description of the program's functions. The program is included with the article.

Wyckoff, L. Benjamin. "Dynamic Item Scheduling." *80 Microcomputing* Issue no. 29 (May 1982): 316-317.

The author has developed a program that is appropriate for repetitious drill and practice applications. The program, along with documentation, is included with the article.

General Educational Issues

Bork, Alfred. "Educational Technology and the Future." *Journal of Educational Technology System* 10, no. 1 (1981-1982): 3-20.

The author examines the types of technological tools that educators may be using in the future. in this paper he outlines and describes some of the implications that these tools hold for the educational environment.

Brumbaugh, Kenneth E. "Computer Literacy—1985." *The Computing Teacher* 8, no. 4 (Academic Year 1980-1981): 49-50.

The author writes that by 1985 this country should have a computer-literate student population. He outlines some of the steps that need to be taken, educationally and politically, to develop this literacy.

Evans, Christopher. "An Invitation to the (Near) Future." *Today's Education* 71, no. 2 (April-May 1982): 12-15.

The author describes changes that he sees occurring in technological tools that will become available to educators in the 1980s. He posits changes that these tools will effect in the teaching process, and cautions about what educators need to consider in their use.

Evans, Christopher. *The Micro Millennium*. New York, NY: Viking Press, 1979.

The author writes about the impact that computers are having and will continue to have upon society. According to him, the future is one that will experience a transformation at all levels due to the impact of computer technology.

Gress, Eileen K. "The Future of Computer Education: Invincible Innovation or Transitory Transformation." *The Computing Teacher* 9, no. 1 (September 1981): 39-42.

The author writes about the way in which the microcomputer should be used in the future to further education. She writes that educators have a vested interest in integrating the computer into regular class work because: (1) trends and projections indicate that micros will be in many homes in a few years; and (2) the job market increasingly requires computer knowledge and experience.

Lambrecht, Judith, and McClelland, Jerry. "At Home with the Computer." *VocEd* 57, no. 3 (April 1982): 46, 50-51.

The authors describe a home of the future that is largely monitored and controlled by a microcomputer. They also explore diverse ways in which individual family members use the computer. These include home management, educational, and professional applications.

Lipson, Joseph. I. "The Future of Educational Technology in the Workplace." In *Proceedings of the Fourth International Learning Technology Conference*, pp. 1-4. Orlando, FL: Society for Applied Learning Technology, 22-24 February 1982.

The author speculates about the future of educational technology. He focuses upon new hardware and software developments (e.g., high resolution, flat screens, and intelligent programs) and new ways in which the learner will interact with this technology.

Shea, Tom. "Think Tanks Differ in Thoughts about Future of Micros." *InfoWorld* 4, no. 25 (June 1982): 14-15.

This article examines the viewpoints held by several prestigious firms throughout the U.S. regarding the role of microcomputers for the future. The article touches upon the impact of microcomputers for education, homes, and the workplace.

Steffin, Sherwin. "The Future in Education." *Softline* 1, no. 5 (May 1982): 23-24.

The author presents a brief narrative outlining the future of computer use in education. His focus is three-fold: (1) computer and the learner; (2) computer and the management of instruction; (3) the computer as it affects the environment in which learning occurs.

Tursman, Andy. "Computers in Education." *The School Administrator* 39, no. 4 (April 1982): 12-13.

The article is an interview with Seymour Papert, author of *Mindstorms* and of the LOGO programming language. He discusses how computers can positively influence the learning process, then talks about specific changes he foresees in education as a result of computer use. He cautions, however, that political difficulties may allay the adoption of positive changes.

Uthe, Elaine F. *Communications Technology for the Year 2000: With Implications for Vocational Education*. Lexington, KY: University of Kentucky, 1982.

The author examines emerging trends and projected directions for the field of communications technology. She explores critical issues and potential societal impacts associated with the new technology. She focuses special attention on the implications these technological developments hold for vocational education.

Wise, Deborah. "Experts Speculate on Future Electronic Learning Environments." *InfoWorld* 4, no. 16 (16 April 1982): 6.

The author reports on a one-day conference on the future of the learning environment that was held at Columbia University's Teachers College. The speakers explored both the positive opportunities that are anticipated as a result of new technological developments and the negative occurrences that can result if the technology is misused.

Technology for Education

Bransford, Louis A., and Debler, Mary. "Delivery of Instructional Materials Using a Communications Satellite." In *Proceedings of the Fourth International Learning Technology Conference*, pp. 17-22. Orlando, FL: Society for Applied Learning Technology, 22-24 February 1982.

The authors examine the influence that a communications satellite can have upon the instructional delivery of vocational and occupational education. They look at specific ways

in which vocational education will need to change in coming years and suggest several ways in which the use of a communications satellite can hasten these changes.

Daynes, Rod. "Experimenting with Videodiscs: Programs for This Emerging Medium Require New Attitudes toward Pacing, Organization, and Style." *Instructional Innovator* 27, no. 2 (February 1982): 24-25, 44.

The article is a short, descriptive overview of the process involved in developing and designing programs for the videodisc.

Fletcher, J. D. "Videodisc Overview." *Proceedings of the Annual Convention of the Association for the Development of Computer-Based Instructional Systems. Volume I.* San Diego, CA: Association for the Development of Computer-Based Instructional Systems, 27 February - 1 March 1979.

The author presents an overview of videodisc technology and posits what this technology signifies for the future of education. He provides a review of the historical development of videodisc technology and examines issues related to the use of the videodisc for education.

Frenzel, Louis E. "Learning with Micros." *Interface Age* 6, no. 4 (April 1981): 40-41.

The author discusses the potential impact that a combined microcomputer-video disc system could have on education. He writes, however, that this particular combination will never have widespread educational use. He discusses his reasons for making this statement.

Glenn, Allen D., and Kehrberg, Kent T. "The Intelligent Videodisc: An Instructional Tool for the Classroom." *Educational Technology* 21, no. 10 (October 1981): 60-63.

The authors write that the videodisc has already "arrived," but that it will undoubtedly undergo many changes in coming years. They say that educators must begin now to explore ways to use this technology. They describe one such educational experiment currently underway at the Minnesota Educational Computing Consortium.

Gold, Jordan. "New Technology Partners: Video and Computers." *Personal Computing* 6, no. 4 (April 1982): 64-65, 70.

The author describes three educational projects currently underway that utilize the videodisc. Two of the projects are in the planning stage. The third is almost ready for dissemination. He posits several positive results that he expects to occur from the use of the videodisc for education and training.

Hirschbul, John S. "Hardware Considerations for Computer-Based Education in the 1980s." *Journal for Research and Development in Education* 14, no. 1 (Fall 1980): 41-56.

The author writes that because of an enormous explosion in computer technology, today's educators are on the edge of an organizational and instructional revolution. He examines changes in technological hardware that he expects in coming years and the impact these likely will have upon instructional delivery.

Lubar, David. "Dawn of the Disk." *Creative Computing* 7, no. 1 (January 1981): 50, 52, 54.

The author reports on a conference on Interactive Videodiscs in Education and Training that was held in Washington, D.C. The concern expressed by most attendees was learning about the videodisc's potential and the effect it will exercise on education.

Merrill, Paul F., and Bennion, Juniris L. "Videodisc Technology in Education: The Current Scene." *NSPI Journal* 18, no. 9 (November 1979): 18-19, 22-26.

The authors present an overview of videodisc technology, describe the components of a videodisc system and explain why the technology is of interest to educators. Videodisc authoring considerations are offered and several current projects are reviewed.

Marx, Raymond J. "Videodisc-based Training: Does It Make Economic Sense?" *Training/HRD* 19, no. 3 (March 1982): 56-58, 60-61, 65.

The author offers a guide for those who are considering the videodisc as a training device. He explains what videodiscs can and cannot do, and indicates questions that need to be considered before the use of a videodisc is adopted.

Skert, Nancy. "Interactive Video: The Marriage of Computers and Videodisc." *Audio Visual Directions* 4, no. 4 (May 1982): 14, 17-19, 20.

The author presents a brief history of videodisc development and provides a set of guidelines for program development using a videodisc. She examines several current and potential applications of videodiscs in the workplace. She says that the medium is still too new for exact predictions to be made.

Wood, Dr. R. Kent. "Microcomputers and Videodiscs: New Dimensions for Computer-Based Education" In *Proceedings of the Fourth International Learning Technology Conference*, pp. 83-91. Orlando, FL: Society for Applied Learning Technologies, 22-24 February 1982.

The author writes that the combined technologies of the microcomputer and videodisc hold much more potential for education and training than is obvious to the casual observer. He reviews ways in which the learning process will change because of the videodisc, and what critical ingredients are needed for instructional videodisc design.

Working Environment

Atron, Marvin, and O'Toole, Thomas. "Careers with a Future: Where the Jobs Will Be In the 1990s." *The Futurist* 16, no. 3 (June 1982): 11-19.

The authors write about the changing nature of work and employment opportunities that can be expected between now and the 1990s. They cite specific (and for the most part, technical) occupations that will offer employment possibilities. Needed training, typical duties, and average salaries for these occupations are reviewed. The authors call for extensive updating of our educational and training programs to address these changes.

"Conference on Micro-electronics at Work." *Social and Labour Bulletin* 4 (1979): 331-333.

The article summarizes a meeting of academics, government, union and management officials held in the Netherlands in 1979 to discuss socioeconomic problems related to

microelectronics technology in the workplace. The employment impact was the focal point of the meeting. Policies to offset employment loss and dislocation are discussed.

"Employment Impact of New Technology." *Social and Labour Bulletin* 1 (March 1980): 9-11.

The article is a summary of a report prepared by the Manpower Study Group on Micro-Electronics of the United Kingdom's Department of Employment. The group examined the employment implications of microelectronic technology up to 1990. The article summarizes the implications and presents societal, organizational, and political recommendations for dealing with anticipated changes.

Hill, David A. "The Face of the Future: Agriculture." *VocEd* 57, no. 1 (January-February 1982): 35, 83.

The article is about expected changes in agricultural technology. One of the major changes detailed in the article is farmers' growing use of computers to help with farm management and decision-making tasks. Specific computer applications that await future farmers are identified.

"How Far Away Is the Electronic Home Office?" *Social and Labour Bulletin* 2 (June 1980): 152-153.

The article is a summary of a conference on Office Automation that was held in Atlanta, Georgia. The conferees discussed the fact that in the future office, workers and managers will need to be familar with computer technology. The important role of the educational system in providing the familiarity was mentioned.

"The Impact of Micro-Electronics on Employment in Western Europe in the 1980s." *Social and Labour Bulletin* 4 (1979): 333-335.

The article is a summary of a report on the employment impact of microelectronics in western Europe in the 1980s. The report indicates that job losses have already occurred, and that the status of relationships in the workplace is being altered. Although a largely negative impact is expected from the technology, positive steps can be taken to reduce or offset the changes.

Moody, Gerald H. "The Face of the Future: The Office." *VocEd* 57, no. 1 (January-February 1982): 36, 83.

The author looks at the future of technology for the office. He identifies the equipment that will be found in that office and responsibilities that may face the worker. He stresses the need for careful planning and management of the evolving changes as well as the fact that jobs will both be lost and created.

Simich, Jack. "Computers Transform an Industry." *VocEd* 57, no. 8 (April 1982): 33-35.

The author writes about the use of computers in the printing industry. He describes the transformation computers have induced, to date, in the industry itself and in worker requirements. He projects that the use of computers in the industry will continue and says that schools should include computer skills in their course offerings.

"Tripartele Discussions Take Up the Question of Microelectronics." *Social and Labour Bulletin* 2 (June 1980): 153-155.

The article is a summary of a report issued in February, 1980 by the Employment Committee of the European Committee on the Employment Impact of Microelectronics. The report says that computerization will not necessarily lead to a loss of jobs, but that there is no certainty that enough jobs will be created to compensate for those that are lost. The Committee forsees problems related to the new technology but offers recommendations for meeting them. Training and education are key elements for societal adaptation.

"Will Microprocessors Wipe out Secretarial Jobs?" *Social and Labour Bulletin* 1 (March 1980): 11.

The author examines potential job losses occurring in the United Kingdom as a result of the introduction of microprocessors. He says that job losses will not be offset by the job creation that will accompany the new technology, and that the female labor force will be the most severely affected. Also, he suggests the loss will occur gradually and that society, if it chooses, can absorb the dislocations.

"Will Your Job Exist in 2005? An Interview with Adam Osborne." *Instructional Innovator* 25, no. 3 (March 1980): 27-29.

Adam Osborne, the creator of the Osborne microcomputer, is interviewed regarding the employment impact of microprocessors and microelectronics technology. He speaks about job loss and creation and macro-level employment shifts. He focuses his attention on information science saying this will be boom industry, and describes the type of work and worker that will be prevalent in that sector.